



May 2021

LEAD PAINT IN HOUSING

Key Considerations for Adopting Stricter Lead Evaluation Methods in HUD's Voucher Program

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GAO Highlights

Highlights of [GAO-21-325](#), a report to congressional committees

May 2021

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Key Considerations for Adopting Stricter Lead Evaluation Methods in HUD's Voucher Program

Why GAO Did This Study

Exposure to lead paint, which was used in housing built before 1978, can have serious health effects, especially for young children. The Department of Housing and Urban Development (HUD) has primary responsibility for identifying lead paint hazards in housing receiving HUD assistance, including private rental units in the voucher program. Some members of Congress have raised questions about whether the voucher program should change from visual assessments to a stricter lead evaluation method.

The 2017 Consolidated Appropriations Act, Joint Explanatory Statement, includes a provision for GAO to review HUD's efforts to address lead paint hazards. This report identifies considerations for policymakers related to changing to stricter lead evaluation methods for the voucher program, specifically regarding the (1) number and characteristics of voucher housing units and their occupants, (2) costs for lead evaluations based on method used and units included, (3) availability of lead professionals, and (4) observations from selected cities that use lead evaluation methods stricter than visual assessments.

GAO analyzed HUD data on the voucher program (as of year-end 2019, the most recent available) and information on lead professionals from the Environmental Protection Agency (EPA) and states. GAO also conducted a nationwide, generalizable survey of lead professionals to estimate the costs of lead evaluation methods. In addition, GAO interviewed staff from HUD, EPA, and public housing agencies, and representatives from two national organizations that represent lead professionals.

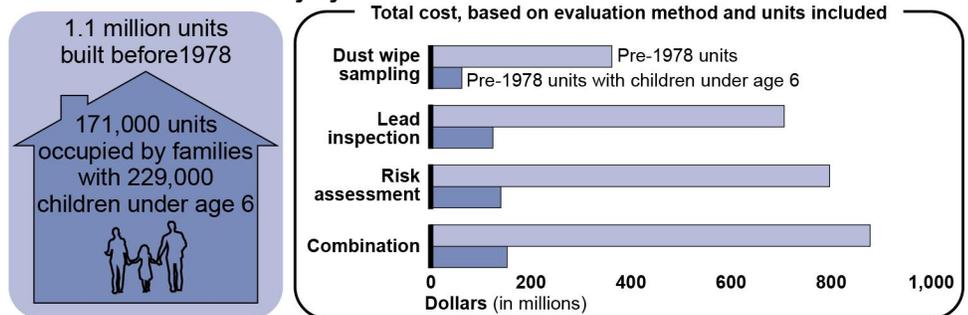
View [GAO-21-325](#). For more information, contact John H. Pendleton at (202) 512-8678 or pendletonj@gao.gov.

What GAO Found

GAO found that the Housing Choice Voucher program had 1.1 million voucher holders living in units built before 1978, the year the U.S. banned lead paint in housing. Of these units, roughly 171,000 were occupied by approximately 229,000 young children (under age 6)—putting these children at an increased risk of lead exposure. The voucher program requires visual assessments for identifying deteriorated paint, with no testing of paint or dust. Any change to stricter evaluation methods would need to consider that certain states have a larger portion of pre-1978 voucher units occupied by families with young children.

Estimated costs for adopting stricter lead evaluation methods for the voucher program would vary substantially depending on the method used and what units were included (see figure). Estimated initial costs range from about \$60 million for a less expensive method applied only to units with young children to about \$880 million for a more expensive method applied to all pre-1978 units. These estimated costs range from 3 percent to 41 percent, respectively, of the fiscal year 2021 budget dedicated to public housing agencies' administrative expenses for the voucher program. Total costs would also depend on the mobility of voucher households and the frequency of any additional lead evaluations.

Total Estimated Cost to Change the Lead Evaluation Methods for Housing Choice Voucher Units Would Vary by Evaluation Method Used and Units Included



Source: GAO analysis of Department of Housing and Urban Development data and GAO survey of lead professionals. | GAO-21-325

Data table for Total Estimated Cost to Change the Lead Evaluation Methods for Housing Choice Voucher Units Would Vary by Evaluation Method Used and Units Included

	Middle	
	All pre-1978 units	Pre-1978 units with children under age 6
*Dust wipe sampling	\$361,628,921	\$62,047,076
Lead paint inspection	\$706,186,258	\$124,075,791
Risk assessment	\$797,250,321	\$139,949,617
Combo	\$877,884,408	\$152,171,978

Note: A combination evaluation includes all components of a lead inspection and a risk assessment. Estimated costs may vary by up to plus or minus 14 percentage points at the 95 percent level of confidence.

GAO analysis estimated that nearly 6,000 lead professionals can conduct lead evaluations in the U.S. While there is no indication of a national shortage of lead professionals, areas with high numbers of pre-1978 voucher units and low numbers of lead professionals may face implementation challenges.

Selected cities offer observations from their implementation of a change in lead evaluation method. For example, education of landlords can help clarify new evaluation requirements and encourage landlords to continue to rent to voucher holders. Further, implementing a new method in phases could target areas with the greatest need and help landlords and the industry adapt to the new requirement and the increased demand for lead evaluations.

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Abbreviations

EPA	Environmental Protection Agency
HUD	Department of Housing and Urban Development
Lead Office	Office of Lead Hazard Control and Healthy Homes
PHA	public housing agency

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May 12, 2021

The Honorable Brian Schatz
Chair
The Honorable Susan Collins
Ranking Member
Subcommittee on Transportation, Housing and Urban Development,
and Related Agencies
Committee on Appropriations
United States Senate

The Honorable David Price
Chairman
The Honorable Mario Diaz-Balart
Ranking Member
Subcommittee on Transportation, and Housing and Urban Development,
and Related Agencies
Committee on Appropriations
House of Representatives

Although the use of lead-containing paint in housing was banned in the United States in 1978, children continue to test positive for dangerous levels of lead.¹ The Department of Housing and Urban Development (HUD) has primary responsibility for identifying and addressing lead paint hazards in its rental assistance programs, which includes the Housing Choice Voucher program (referred to as the voucher program throughout this report).² According to the Centers for Disease Control and Prevention, no safe level of lead in the blood has been identified. When absorbed into the body, even low levels of lead can damage the brain and nervous system, slow development and growth, and cause learning or behavioral problems, especially in young children (those under the age of 6).

The 2017 Consolidated Appropriations Act, Joint Explanatory Statement, Division K, included a provision for us to review HUD's efforts to identify

¹Before it was banned, lead-based paint was widely used in housing built in the United States because of its durability.

²HUD's voucher program is a form of tenant-based rental assistance. We did not examine properties under HUD's project-based rental assistance program or the public housing program.

and address lead paint hazards.³ In June 2018, we reported that HUD requires a stricter lead evaluation method for its public housing program than for its voucher program.⁴ Some members of Congress and advocacy organizations have raised questions about whether the voucher program's requirement to conduct only a visual assessment should match that of the public housing program.⁵ However, in 2018, HUD staff told us HUD does not have the authority to require a stricter evaluation method in the voucher program without a statutory change.

This report follows up on our 2018 report and identifies considerations for policymakers related to changing to stricter lead evaluation methods for HUD's voucher program. Specifically, the report (1) identifies the number and characteristics of voucher units built before 1978 and their occupants, (2) examines estimated costs for lead evaluations and factors that could affect these costs, (3) examines the availability of lead professionals, and (4) provides observations from selected cities that use lead evaluation methods stricter than visual assessments. This report focuses on lead evaluation methods only for HUD's Housing Choice Voucher program.⁶

To address all four objectives, we reviewed HUD's 2012 guidelines for evaluation and control of lead paint hazards in housing and relevant HUD and Environmental Protection Agency (EPA) regulations, such as the Lead Safe Housing Rule.⁷ Further, we reviewed annual appropriation amounts for fiscal years 2017 through 2021 in HUD's budget documents to provide context on HUD's voucher program and other lead program resources. To gain a better understanding of the lead evaluations and the

³See 163 Cong. Rec. H4088 (daily ed. May 3, 2017).

⁴GAO, *Lead Paint in Housing: HUD Should Strengthen Grant Processes, Compliance Monitoring, and Performance Assessment*, [GAO-18-394](#) (Washington, D.C.: June 19, 2018).

⁵See e.g., *Safe and Decent? Examining the Current State of Residents' Health and Safety in HUD Housing: Testimonies before the House Financial Services Committee, Subcomm. on Housing, Community Development, and Insurance*, 116th Cong., 2d sess. (2019) (Statements of Deborah Thrope of the National Housing Law Project, and Emily Benfer of the Health Justice Advocacy Clinic at Columbia University Law School).

⁶We did not examine other HUD rental assistance programs. For additional information on lead in HUD's project-based rental assistance program, see GAO, *Lead Paint in Housing: HUD Has Not Identified High-Risk Project-Based Rental Assistance Properties*, [GAO-21-55](#) (Washington, D.C.: Dec. 16, 2020).

⁷See e.g., Department of Housing and Urban Development, Office of Healthy Homes and Lead Hazard Control, *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* (Washington, D.C.: July 2012); 24 C.F.R. pt. 35; 40 C.F.R. pt. 745.

voucher program, we interviewed HUD staff from the Office of Lead Hazard Control and Healthy Homes (Lead Office), Office of Public and Indian Housing, and Office of Policy Development and Research. We also interviewed staff from EPA, representatives from two industry associations that represent lead professionals, national organizations that advocate for safe or affordable housing, and one academic expert to obtain a better understanding of lead paint evaluation methods and the lead professional industry.

To address the first objective, we analyzed data from HUD's Inventory Management System/PIH Information Center database on voucher units as of December 31, 2019 (referred to as HUD voucher data as of year-end 2019 throughout this report). These data were the most recently available at the time of our review. Specifically, for voucher housing units, we analyzed construction year, geographic location, and the date of birth of all children residing in the units. To assess the reliability of HUD's data, we performed electronic data testing to identify missing or invalid data, interviewed knowledgeable HUD staff, and corroborated the data with other available sources (such as published HUD reports). We determined the voucher data were sufficiently reliable for our purposes of estimating the number of voucher units built before 1978 and those occupied by families with young children, as well as characterizing the location of the voucher units. We also reviewed HUD's most recent American Healthy Homes Survey for estimates of housing units containing lead paint.⁸

To address the second objective, we surveyed a generalizable sample of lead professionals available for public hire to obtain information on costs of various types of lead evaluations and factors that can affect cost. Using the survey data on the per-unit cost of evaluations and HUD's voucher program data as of year-end 2019, we estimated the total costs for initial evaluations if applying four different lead evaluation methods to the voucher program. These four lead evaluation methods are selective dust wipe sampling, lead inspections, risk assessments, and combination

⁸All data were current as of March 2006, the year of survey collection in the latest publication by HUD's Lead Office. See Department of Housing and Urban Development, Office of Healthy Homes and Lead Hazard Control, *American Healthy Homes Survey: Lead and Arsenic Findings* (April 2011). HUD staff noted that the agency is conducting the *American Health Homes Survey II*, with data collected between May 2018 and May 2019, and final results are forthcoming. HUD staff also noted that the preliminary results on estimates of lead paint trends in housing units were similar to data from the 2011 study. For more information, see HUD's website, https://www.hud.gov/program_offices/healthy_homes/ahhs_ii.

evaluations. Because there are uncertainties associated with these estimated costs, we varied the inputs used in the cost calculations and described how these estimates could be sensitive to various factors.

To address the third objective, we analyzed information on certified lead professionals in the United States in 2020. We obtained data for 11 states from EPA and for an additional 38 states and the District of Columbia that administer their own state lead programs.⁹ We analyzed these data to estimate the number of professionals and certifications they held in each state. To assess the reliability of the EPA and state data, we conducted electronic data testing to identify missing data, interviewed knowledgeable EPA staff, and spot-checked information by comparing it with other publicly available online sources. We determined the data were sufficiently reliable for the purposes of estimating the number of certified lead professionals and certifications in the United States.

To address the fourth objective, we interviewed representatives of public housing agencies (PHA) and advocacy organizations in five selected cities that already required a lead evaluation method stricter than visual assessments for certain rental units.¹⁰ The five cities were Detroit, Newark, Philadelphia, Rochester, and Washington, D.C. We selected these cities to achieve diversity in the lead evaluation methods and geography. In each of the five cities, we selected the PHA with the highest share of voucher units built before 1978 and occupied by families with young children. We selected the advocacy organizations to reflect geographic diversity and because their mission or services focused on

⁹EPA administers the lead paint program in 11 states and has delegated program authority to the remaining states and the District of Columbia to administer their own programs. The 11 EPA-administered states are Alaska, Arizona, Florida, Idaho, Montana, Nevada, New Mexico, New York, South Carolina, South Dakota, and Wyoming. The New Jersey state lead program did not provide information on the state's lead professionals. However, we were able to identify some lead professionals with New Jersey addresses in the data obtained from EPA—likely because these professionals live in New Jersey and work in both New Jersey and New York, which is an EPA-administered state.

¹⁰PHAs are state and local agencies that administer HUD's rental assistance programs, including the voucher program. We selected the five cities based on information about localities that already required an evaluation method stricter than visual assessments in a study conducted by the Columbia Law School Health Justice Advocacy Clinic, and our discussions about such information with representatives from the National Conference of State Legislatures and the National Housing Law Project. See Columbia Law School Health Justice Advocacy Clinic, *Eliminating Lead Poisoning in New York: A National Survey of Strategies to Protect Children* (New York, NY: Columbia Law School, 2019).

lead paint or children's health advocacy. Appendix I contains additional detail on our methodology.

We conducted this performance audit from September 2019 to May 2021 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

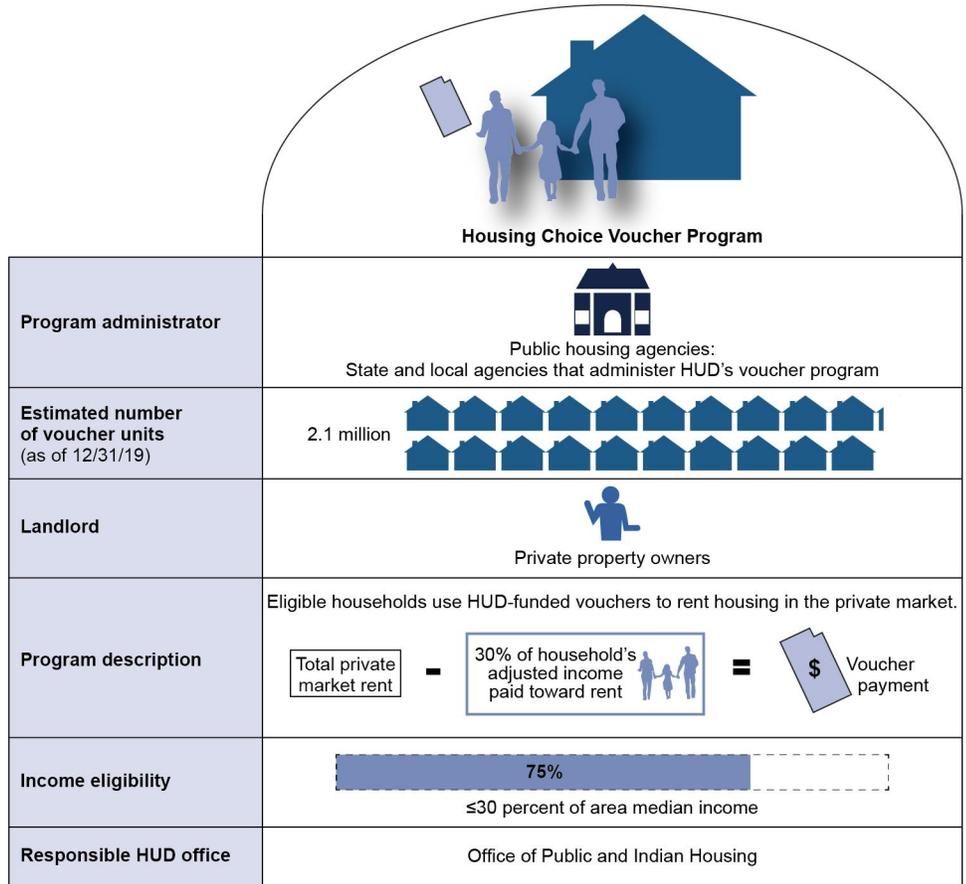
Background

HUD's Voucher Program and Current Visual Assessment Requirements

Under the voucher program, HUD provides vouchers as rental housing assistance to eligible households with very low incomes to use in the private housing market (see fig. 1). It is the nation's largest rental assistance program—over 2 million very low-income households use vouchers. The voucher program does not have a fixed housing stock, unlike HUD's two other large rental assistance programs—public housing and project-based rental assistance. Households that receive a voucher are responsible for finding a suitable housing unit of their choice, given their household composition, with an owner who agrees to rent under the program. Voucher holders can find privately owned housing, such as single-family homes, townhouses, or apartments. PHAs receive federal funds from HUD to administer the voucher program in their state or local jurisdiction. The PHA pays a housing subsidy directly to the landlord on behalf of the participating voucher holder. The voucher holder then generally pays the difference between the actual rent charged by the landlord and the amount subsidized by the program.¹¹

¹¹A household generally pays 30 percent of its monthly adjusted income toward rent for a unit with a housing size that meets the needs of the household, and the PHA pays the landlord the remainder of the rent through a HUD-subsidized voucher. The voucher generally is equal to the difference between (1) the lesser of the unit's gross rent (generally, rent plus utilities) or a local "payment standard" and (2) the household's payment. The payment standard is based on the local fair market rent established by HUD.

Figure 1: HUD's Housing Choice Voucher Program



Source: Department of Housing and Urban Development (HUD). | GAO-21-325

Text for Figure 1: HUD's Housing Choice Voucher Program

Housing Choice Voucher Program

- Program Administrator: Public housing agencies: State and local agencies that administer HUD's voucher program
- Estimated number of voucher units (as of 12/31/19): 2.1 million
- Landlord: private property owners
- Program description: Eligible households use HUD-funded vouchers to rent housing in the private market. Total private market rent minus 30% of household's adjusted income paid toward rent, equals Voucher payment

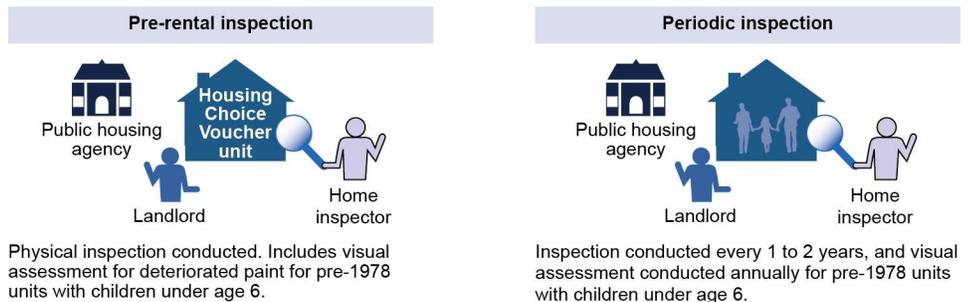
- Income eligibility: 75% (less than 30 percent of area median income)
- Responsible HUD office: Office of public and indian housing.

Note: The amount of the voucher payment can partly depend on the local fair market rent established by HUD. While a voucher household's income generally may not exceed 50 percent of the area median income, a public housing agency is generally required to provide at least 75 percent of its vouchers to households whose incomes do not exceed the higher of the applicable poverty guidelines or 30 percent of the area median income.

Based on our analysis of HUD data, voucher households occupied 2.1 million housing units as of year-end 2019.¹² However, even if the aggregate number of voucher households (and housing units they occupied) were to remain constant over time, the specific housing units can change as voucher holders move residences. Because vouchers are portable, households can take their vouchers and move to other housing units at the end of their leases. When voucher households move, landlords may continue or stop renting their housing units to other voucher holders.

Housing units in the voucher program must meet minimum standards of health and safety, as determined by PHAs and governed by federal laws and regulations.¹³ Participating landlords' housing units must undergo physical inspections to determine whether they meet housing quality standards prior to tenant move-in and every 1 to 2 years during occupancy (see fig. 2).

Figure 2: Inspections of Department of Housing and Urban Development Housing Choice Voucher Units



Source: GAO. | GAO-21-325

¹²The data included households receiving special purpose voucher assistance, such as HUD-Veterans Affairs Supportive Housing assistance.

¹³42 U.S.C. § 1437f(o)(8); 24 C.F.R. §§ 982.401-982.407.

Text of Figure 2: Inspections of Department of Housing and Urban Development Housing Choice Voucher Units

- Prerental inspection: Physical inspection conducted. Includes visual assessment for deteriorated paint for pre-1978 units with children under age 6.
- Periodic inspection: Inspection conducted every 1 to 2 years, and visual assessment conducted annually for pre-1978 units with children under age 6.

Note: A visual assessment identifies deteriorated paint but does not involve testing paint chips or dust samples to determine the presence of lead. Landlords are required to repair deteriorated paint identified in a visual assessment.

For voucher units built before 1978 that house one or more children under the age of 6, HUD requires PHAs to conduct annual visual assessments for deteriorated paint as part of the physical inspections.¹⁴ Home inspectors do not need to be certified lead professionals but can perform visual assessments if they pass the HUD online training course on visual assessments.¹⁵ A visual assessment does not involve testing paint chips or dust samples from surfaces to determine the presence of lead. If deteriorated paint is identified in the visual assessments, landlords are required to perform necessary repairs and arrange for additional inspections after the repairs.¹⁶

Sources of Lead in Housing

Lead dust and deteriorated lead paint (e.g., paint that is peeling, chipping, cracking, or damaged) continue to be the largest sources of lead exposure for children, particularly in homes built before 1978. As lead paint ages, it starts to peel and crack, releasing lead into household dust (see fig. 3).

¹⁴See 24 C.F.R. § 35.1215.

¹⁵For more information, see HUD's website, <https://apps.hud.gov/offices/lead/training/visualassessment/h00101.htm>.

¹⁶After repairs above a certain minimum size, a clearance examination is conducted to determine if the housing unit is lead-safe. See 24 C.F.R. §§ 35.1215, 35.1340, 35.1350.

Figure 3: Examples of Deteriorated Paint



Source: GAO. | GAO-21-325

Children under the age of 6 are at greater risk of lead exposure because they have frequent hand-to-mouth activity and often crawl on the floor. Lead exposure affects young children because lead can damage a child's developing brain and nervous system and slow development and growth, as previously noted. The Centers for Disease Control and Prevention sets a health guideline known as the "blood lead reference value" to identify children exposed to more lead than most other children.¹⁷ The current blood lead reference value is 5 micrograms of lead per deciliter of blood. However, cities, states, or tribes may have blood lead reference values that are different from the federal level.¹⁸

HUD Offices and Lead Paint Activities

HUD's Office of Public and Indian Housing oversees the voucher program and enforces PHAs' compliance with HUD's Lead Safe Housing Rule. HUD's Lead Office collaborates with the Office of Public and Indian

¹⁷Children with blood lead levels above the Centers for Disease Control and Prevention's blood lead reference value have blood lead levels in the highest 2.5 percent of all U.S. children (ages 1 to 5). For additional information, see <https://www.cdc.gov/nceh/lead/data/blood-lead-reference-value.htm>.

¹⁸If a state, tribe, or local law or regulation defines lead paint differently than the federal definition, HUD requires participants in its programs to use the more protective definition. 24 C.F.R. § 35.150.

Housing on its oversight and enforcement of this rule. Congress provides appropriations to HUD’s Office of Public and Indian Housing for tenant-based rental assistance, which funds the voucher program. The total appropriation amount for tenant-based rental assistance was approximately \$26 billion in fiscal year 2021 (see table 1).¹⁹ The vast majority of the appropriation funds the voucher program’s housing assistance payments (i.e., rental assistance). However, within each year’s appropriation, Congress provides an amount to PHAs for administrative and other expenses for the voucher program. For example, in fiscal year 2021, Congress appropriated approximately \$2.2 billion for PHAs’ voucher program administrative expenses.²⁰

Table 1: Annual Appropriations for HUD’s Tenant-Based Rental Assistance, 2017–2021

Fiscal Year	2017	2018	2019	2020	2021
Annual appropriations (dollars in billions)	20	22	23	24	26

Source: Annual appropriations acts and Department of Housing and Urban Development (HUD) budget documents. | GAO-21-325

Note: The vast majority of the annual appropriation amounts was for the voucher program’s housing assistance payments (i.e., rental assistance), and a smaller amount was designated for non-voucher rental assistance.

Additionally, the Lead Office received a \$360 million appropriation in fiscal year 2021 for programs related to lead hazard control and healthy homes. HUD’s lead grant programs provide funding to state and local governments to perform lead hazard remediation in private, low-income housing, which can but does not necessarily have to include voucher units.²¹

According to HUD’s fiscal year 2021 budget, the average cost of addressing lead paint hazards in housing units enrolled in the lead grant programs is \$12,000 per unit, which includes the costs of lead evaluation

¹⁹While HUD requested \$30 million to conduct a demonstration using lead hazard screens—which are stricter than visual assessments—in pre-1978 voucher units in its fiscal year 2021 budget request, Congress did not specifically appropriate funds for such a demonstration.

²⁰From fiscal years 2017 through 2021, the administrative expenses remained relatively stable at about 8 percent of the overall tenant-based rental assistance appropriation, according to HUD staff.

²¹HUD’s lead grants cannot be used to pay for lead evaluations or remediation for housing units under HUD’s public housing or project-based rental assistance programs.

and abatement.²² According to HUD’s Lead Office staff, the costs may be higher for these units than for voucher housing units because units enrolled in the lead grant programs are older than the national average. Additionally, staff from HUD’s Office of Public and Indian Housing told us that the cost to address lead paint hazards in voucher units may be lower because landlords of the voucher units typically perform paint stabilization or interim control of deteriorated paint, which is less costly than abatement.²³

Lead Paint Evaluation Methods and Certifications

According to HUD, four lead evaluation methods can be used in housing to help identify lead paint (see fig. 4).²⁴ Lead evaluation methods that involve more than a visual assessment are more comprehensive and stricter, according to HUD. EPA establishes minimum training and certification requirements for lead professionals to perform lead evaluations in housing built before 1978.²⁵

²²Abatement refers to any set of measures (designed in accordance with standards established by appropriate federal agencies) to remove the lead paint or lead paint hazard, contain it (by processes known as “encapsulation” and “enclosure”), or replace the lead-painted surfaces or fixtures.

²³Interim controls refer to any set of measures designed to reduce temporarily human exposure or likely exposure to lead paint hazards. Interim controls include, but are not limited to, repairs, painting, temporary containment, specialized cleaning, clearance, ongoing lead paint maintenance activities, and the establishment and operation of management and resident education programs. See 24 C.F.R. § 35.110.

²⁴A fifth evaluation method is a lead hazard screen—an abbreviated evaluation that identifies lead paint hazards on deteriorated paint surfaces and is used in dwellings in good condition. This report does not focus on lead hazard screens because they are not widely used by lead professionals, according to representatives from HUD and an industry association representing lead professionals. Separately, according to HUD’s Research Roadmap, the agency plans to review the extent to which a lead hazard screen or risk assessment could affect the leasing process and the availability of voucher units. See Department of Housing and Urban Development, Office of Policy Development and Research, *HUD Research Roadmap: 2020 Update* (Washington, D.C.: November 2020).

²⁵40 C.F.R. §§ 745.89, 745.220-239, 745.320-339.

Figure 4: Lead Paint Evaluation Methods

		Definition	Paint surfaces included:			Tests for hazardous lead levels in:		
			Deteriorated paint	Intact paint on friction and impact surfaces (e.g., walls, windows, door frames)	All paint surfaces	Dust	Paint chips	Soil
Generally less strict method	 Dust wipe sampling	Samples dust from floor or window sill, which is sent to a laboratory to test for hazardous lead levels.						
	 Lead paint inspection	Determines the presence of lead paint on all paint surfaces.						
	 Risk assessment	Assesses the existence, nature, severity, and location of lead paint hazards—including by visual inspection; dust wipe or other environmental sampling; and review of age and history of the housing and occupancy by children under age 6.						
Generally stricter method	 Combination of lead paint inspection and risk assessment	Includes all components of a lead paint inspection and a risk assessment. Includes testing of all paint surfaces, including deteriorated, friction, and impaired paint surfaces.						

Source: GAO analysis of Department of Housing and Urban Development guidelines. | GAO-21-325

Lead professionals (lead inspectors and risk assessors) need to obtain certifications from EPA or their relevant state lead programs to conduct lead evaluations. At a minimum, the state training and certification requirements must be as protective (i.e., as stringent) as EPA’s for the training and certification of lead professionals in their state. However, the state programs may impose more stringent requirements. Lead professionals typically use specialized instruments during lead evaluations for determining the presence of lead paint (see fig. 5). Additionally, lead professionals must send dust wipe samples to a

laboratory for lead dust analysis. There were 110 EPA-recognized laboratories in 34 states as of February 2021.²⁶

Figure 5: Examples of Instruments Used in Lead Evaluations



An X-ray fluorescence analyzer is typically used in a lead inspection to measure the amount of lead in paint on a painted surface.



Specialized wipes are used in dust wipe sampling to collect dust.

Source: GAO. | GAO-21-325

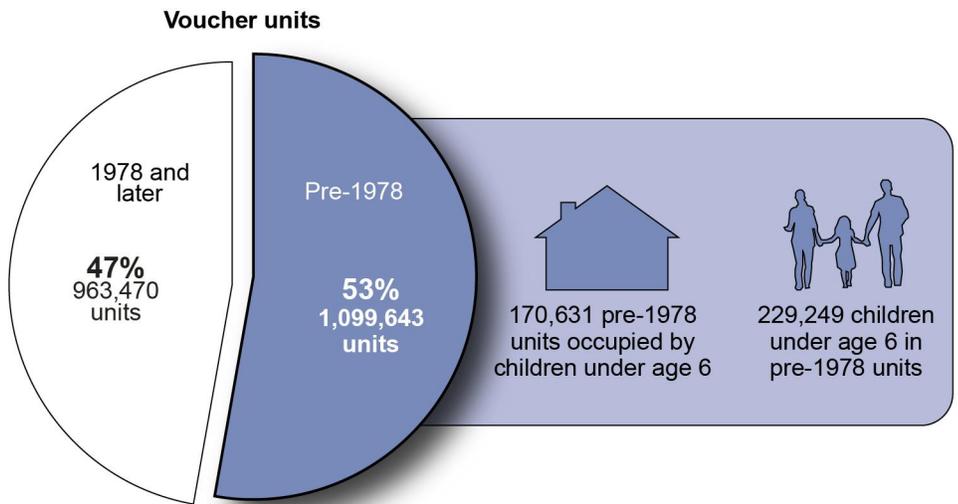
²⁶Under the National Lead Laboratory Accreditation Program, EPA recognizes laboratories based on EPA requirements for analyzing paint chips, dust, or soil samples for the presence of lead. See a list of EPA-recognized laboratories at <https://www.epa.gov/lead/national-lead-laboratory-accreditation-program-list>.

Many Voucher Units Were Built before 1978 and Are Occupied by Young Children, Presenting Increased Risk of Lead Exposure

Half of Voucher Units Were Built before 1978, of Which 171,000 Are Occupied by Families with Young Children

According to our analysis of HUD data, voucher holders lived in 2.1 million housing units as of year-end 2019. Of these units, 1.1 million (53 percent) were built before 1978—the year the United States banned the use of lead paint in housing (see fig. 6). Further, we estimated that about 171,000 (16 percent) of these units were occupied by families that included about 229,000 young children.

Figure 6: HUD Housing Choice Voucher Units Built before 1978 and Occupied by Families with Children under Age 6, as of December 31, 2019



Source: GAO analysis of Department of Housing and Urban Development (HUD) data. | GAO-21-325

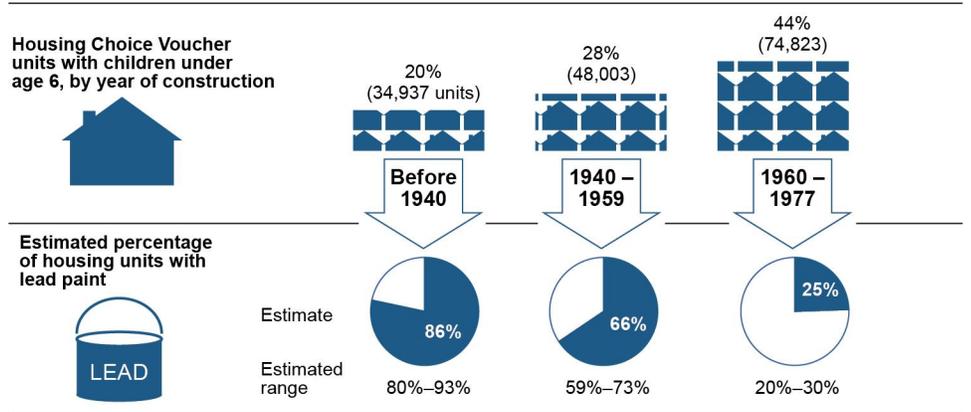
Data table of Figure 6: HUD Housing Choice Voucher Units Built before 1978 and Occupied by Families with Children under Age 6, as of December 31, 2019

Voucher Unit Analysis (Construction Year)	Unites	Percentage
Pre-78	1,099,643	53%
Post-78	963,470	47%
Total	2,065,330	

Voucher Unit Analysis (Construction Year)	Unites	Percentage
Household Analysis (Children, Pre-78 Units)		
Pre-78 units occupied by young children	170,631	
Young children in pre-78 units	229,249	

According to HUD, the older the housing is, the more likely it is to contain lead paint. Specifically, housing units constructed before 1940 are much more likely to contain lead paint compared with units constructed in the 1960s and 1970s (see fig. 7), according a 2011 HUD study (the most recent that measured this).²⁷ Of the pre-1978 voucher units occupied by young children as of year-end 2019, 20 percent were constructed before 1940, 28 percent were constructed from 1940 to 1959, and 44 percent were constructed from 1960 to 1977.²⁸

Figure 7: Likelihood of Lead Paint in HUD Housing Choice Voucher Units Increases with the Age of the Housing



Source: GAO analysis of U.S. Department of Housing and Urban Development's (HUD) data. | GAO-21-325

²⁷Department of Housing and Urban Development, Office of Healthy Homes and Lead Hazard Control, *American Healthy Homes Survey: Lead and Arsenic Findings* (April 2011). As previously discussed, HUD staff noted that the agency is conducting the *American Health Homes Survey II*, with data collected between May 2018 and May 2019, and final results are forthcoming. HUD staff noted that preliminary results on estimates of lead paint trends in housing units were similar to the 2011 study. The 2011 study also noted that not all units with lead paint had lead paint hazards.

²⁸The remaining 8 percent of voucher units (about 13,000 units) were excluded from this analysis because these units did not have a valid, specific construction year in HUD's voucher data. See app. I for additional information on our methodology.

Data table for Figure 7: Likelihood of Lead Paint in HUD Housing Choice Voucher Units Increases with the Age of the Housing

Construction year	Percentage of Housing Choice Voucher Units	Estimated percentage of housing units with lead paint hazards (range of estimated percentages)^a
Before 1940	20% (34,937 units)	86.2 (79.7, 92.7)
1940-1959	28% (48,003 units)	65.8 (58.6, 73)
1960-1977	44% (74,823 units)	24.6 (19.5, 29.8)

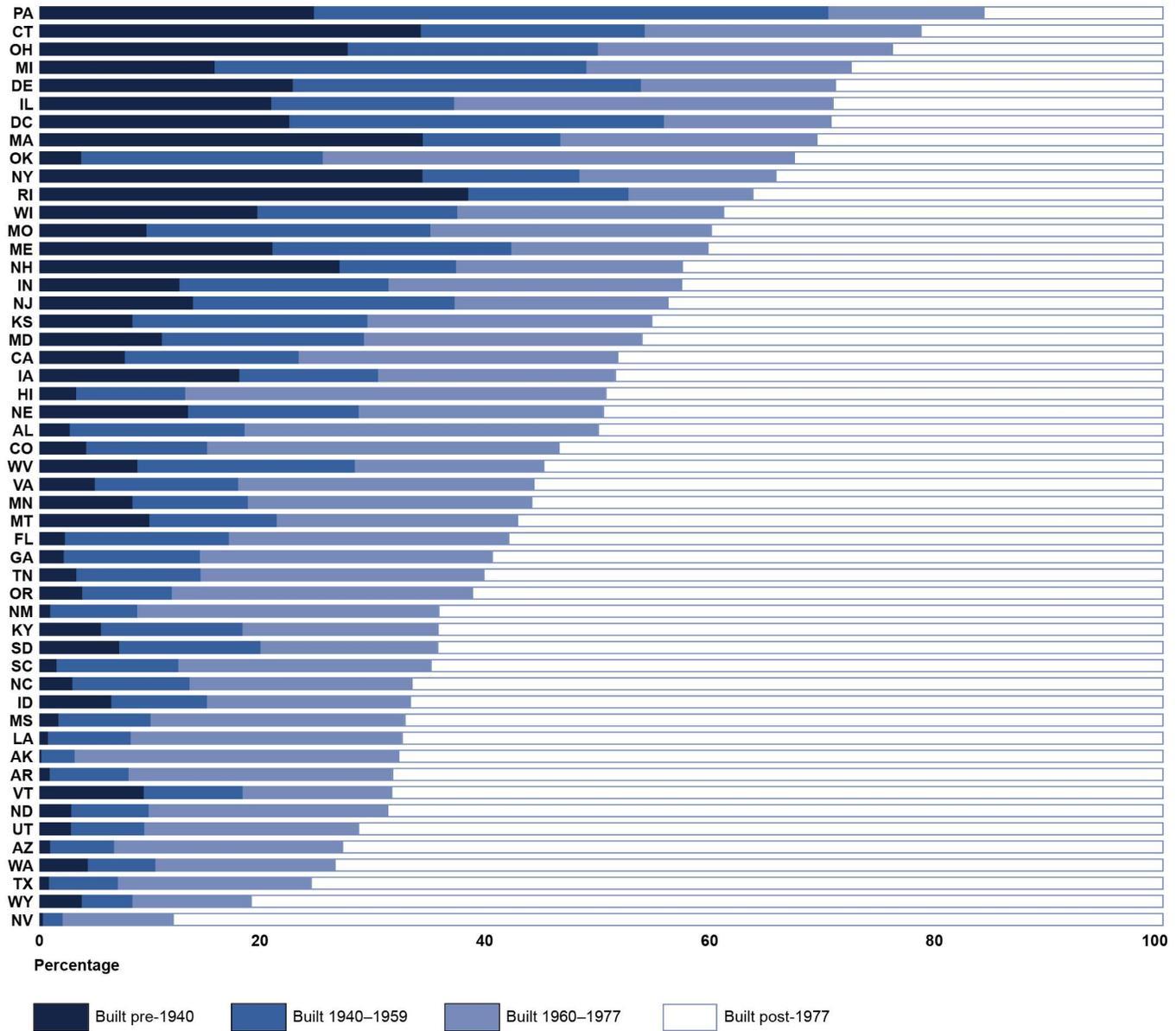
Note: Data on the Housing Choice Voucher program are as of year-end 2019. The percentages of voucher units do not sum to 100 percent because we excluded units (8 percent) for which HUD did not have a valid, specific construction year. Estimates for the percentage of housing units with lead paint derive from the American Healthy Homes Survey, which was conducted from June 2005 through March 2006. Because the survey contains estimates from a sample, the estimates are also presented in ranges, with the lower and upper ends representing the 95 percent confidence interval.

Certain States Have a Larger Proportion of Voucher Units Built before 1978 and Occupied by Families with Young Children

In some states, a large share of voucher holders were families with young children living in housing units constructed before 1978, as of year-end 2019 (see fig. 8). For example, in Pennsylvania, Connecticut, and Ohio, over 75 percent of voucher units occupied by families with young children were built before 1978. In another 21 states, at least 50 percent of each state’s voucher units occupied by families with young children were built before 1978.²⁹

²⁹See app. II for additional information on voucher units by construction year and by state.

Figure 8: Percentage of HUD Housing Choice Voucher Units Occupied by Families with Children under Age 6 and Age of Property, by State, as of December 31, 2019



Source: GAO analysis of Department of Housing and Urban Development (HUD) data. | GAO-21-325

Data table for Figure 8: Percentage of HUD Housing Choice Voucher Units Occupied by Families with Children under Age 6 and Age of Property, by State, as of December 31, 2019

State	Pre-1940 Units With Young Children	1940-1959 Units With Young Children	1960-1977 Units With Young Children	Post-1977 Units With Young Children	Percentage of Pre-1940 Units with Young Children	Percentage of 1940-1959 Units with Young Children	Percentage of 1960-1977 Units with Young Children	Percentage of Post-1977 Units with Young Children
PA	2619	4909	1480	1718	24.4173	45.76729	13.79825	16.01715
CT	1286	754	930	819	33.94035	19.89971	24.54473	21.6152
OH	4283	3477	4089	3775	27.41295	22.25422	26.17127	24.16155
MI	1384	2937	2088	2472	15.58383	33.0706	23.51087	27.8347
DE	145	199	111	188	22.55054	30.94868	17.26283	29.23795
IL	2930	2313	4781	4185	20.62073	16.27842	33.64769	29.45316
DC	30	45	20	40	22.22222	33.33333	14.81481	29.62963
MA	1876	674	1252	1699	34.10289	12.25232	22.7595	30.88529
OK	172	991	1932	1517	3.729402	21.48742	41.89072	32.89245
NY	7770	3183	3970	7872	34.08642	13.96359	17.4161	34.53389
RI	364	136	105	349	38.15514	14.25577	11.00629	36.58281
WI	682	625	832	1378	19.39153	17.77083	23.65653	39.18112
MO	672	1784	1762	2844	9.515718	25.26197	24.95044	40.27188
ME	207	212	174	405	20.74148	21.24248	17.43487	40.58116
NH	170	66	128	273	26.6876	10.36107	20.09419	42.85714
IN	852	1273	1779	2935	12.45796	18.61383	26.01257	42.91563
NJ	1218	2077	1688	3936	13.65624	23.28736	18.92589	44.13051
KS	141	356	430	776	8.279507	20.90429	25.24956	45.56665
MD	734	1211	1665	3130	10.89021	17.96736	24.70326	46.43917
CA	2304	4704	8605	14761	7.585435	15.48693	28.33015	48.59748
IA	580	403	688	1593	17.76961	12.34681	21.07843	48.80515
HI	64	190	733	973	3.265306	9.693878	37.39796	49.64286
NE	312	359	513	1178	13.20914	15.19898	21.71888	49.87299
AL	193	1115	2254	3608	2.691771	15.55091	31.43654	50.32078
CO	181	465	1355	2332	4.177244	10.73159	31.27164	53.81952
WV	217	482	418	1375	8.707865	19.34189	16.77368	55.17657
VA	346	897	1848	3943	4.918965	12.75235	26.27239	56.0563
MN	434	539	1324	2953	8.266667	10.26667	25.21905	56.24762
MT	69	80	151	406	9.773371	11.33144	21.3881	57.50708
FL	378	2448	4162	9770	2.255639	14.60795	24.8359	58.30051
GA	220	1230	2638	6073	2.165141	12.10511	25.96201	59.76774
TN	252	853	1937	4660	3.271877	11.07505	25.14931	60.50377

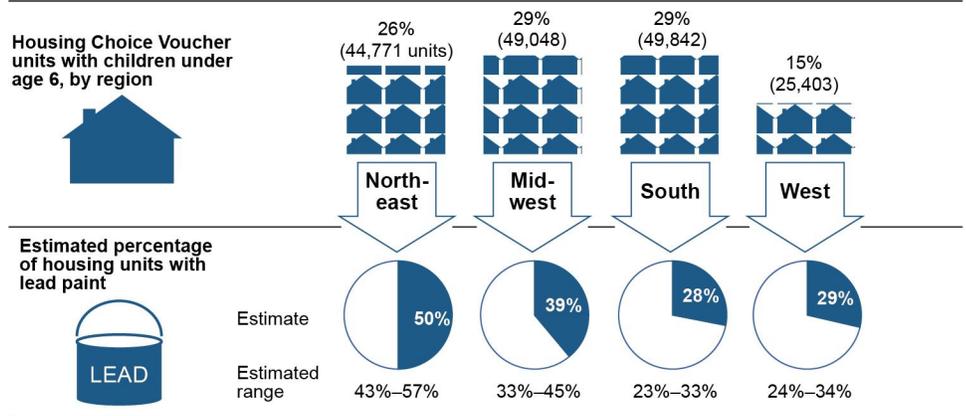
Letter

State	Pre-1940 Units With Young Children	1940-1959 Units With Young Children	1960-1977 Units With Young Children	Post-1977 Units With Young Children	Percentage of Pre-1940 Units with Young Children	Percentage of 1940-1959 Units with Young Children	Percentage of 1960-1977 Units with Young Children	Percentage of Post-1977 Units with Young Children
OR	163	340	1140	2627	3.81733	7.962529	26.69789	61.52225
NM	18	142	493	1187	0.978261	7.717391	26.79348	64.51087
KY	285	655	902	3360	5.478662	12.59131	17.33948	64.59054
SD	70	124	155	637	7.099391	12.57606	15.72008	64.60446
SC	74	527	1090	3169	1.522634	10.84362	22.42798	65.20576
NC	264	940	1782	6037	2.925856	10.41782	19.74953	66.90679
ID	61	81	172	639	6.400839	8.499475	18.04827	67.05142
MS	79	382	1053	3148	1.694552	8.193908	22.58687	67.52467
LA	69	657	2157	6063	0.771294	7.344064	24.11133	67.77331
AK	1	19	183	433	0.157233	2.987421	28.77358	68.08176
AR	38	287	962	2815	0.926377	6.996587	23.45197	68.62506
VT	59	56	84	437	9.27673	8.805031	13.20755	68.71069
ND	30	73	225	732	2.830189	6.886792	21.22642	69.0566
UT	45	104	304	1145	2.81602	6.508135	19.02378	71.65207
AZ	33	194	693	2498	0.965477	5.675834	20.27501	73.08367
WA	279	388	1031	4771	4.312877	5.997836	15.93755	73.75174
TX	251	1775	4974	22005	0.865368	6.119635	17.14877	75.86623
WY	10	12	28	216	3.759398	4.511278	10.52632	81.20301
NV	7	40	223	2008	0.307287	1.755926	9.789289	88.1475

Furthermore, some of these states also have a large share of voucher families with young children living in very old housing (built before 1940), which is much more likely to contain lead paint. A concentration of voucher holders with young children living in very old housing exists in Rhode Island (38 percent), Massachusetts (34 percent), New York (34 percent), and Connecticut (34 percent).

Additionally, certain regions of the United States have more housing estimated to contain lead paint, according to HUD's 2011 study (see fig. 9). For example, roughly 50 percent of housing in the Northeast is estimated to contain lead paint, compared with less than 30 percent in the South and West.

Figure 9: Likelihood of Lead Paint in HUD Housing Choice Voucher Units Varies by Region



Source: GAO analysis of U.S. Department of Housing and Urban Development's (HUD) data. | GAO-21-325

Data table for Figure 9: Likelihood of Lead Paint in HUD Housing Choice Voucher Units Varies by Region

Region	Percentage of Housing Choice Voucher Units	Estimated Percentage of housing units with lead paint hazards (range of estimated percentages) ^a
Northeast	26% (44,771 units)	50.1 (43.3, 57.0)
Midwest	29% (49,048 units)	39.0 (33.4, 44.6)
South	29% (49,842)	28.2 (23.2, 33.3)
West	15% (25,403 units)	28.8 (23.8, 33.8)

Note: Data on the Housing Choice Voucher program are as of year-end 2019. The percentages of voucher units do not sum to 100 percent because we do not report on the 1 percent of the voucher units that are located in the U.S. territories. Estimates for the percentage of housing units with lead paint derive from the American Healthy Homes Survey, which was conducted from June 2005 through March 2006. Because the survey contains estimates from a sample, the estimates are also presented in ranges, with the lower and upper ends representing the 95 percent confidence interval.

Cost to Adopt Stricter Lead Evaluation Methods Would Be Sizeable and Would Vary Based on Evaluation Method and Tenant Turnover

Per-Unit Cost for Lead Evaluation Varied in 2019

Based on our survey, the per-unit cost charged by the majority of lead professionals varied depending on the lead evaluation method used (see fig. 10).³⁰

Figure 10: Estimated Costs of Lead Evaluations for Single-Family Homes Charged by a Majority of Lead Professionals, 2019

Method	Estimated cost
 Dust wipe sampling	\$50–\$400
 Lead paint inspection	\$300–\$900
 Risk assessment	\$400–\$900
 Combination of lead paint inspection and risk assessment	\$500–\$1,000

Source: GAO analysis of survey of lead professionals. | GAO-21-325

Data table for Figure 10: Estimated Costs of Lead Evaluations for Single-Family Homes Charged by a Majority of Lead Professionals, 2019

Evaluation method price range

Dust Wipes Price for Single Family Homes \$50 or less-400

Lead Inspection Price for Single Family Homes \$300 or less -900

Risk Assessment Price for Single Family Homes \$400 or less -900

³⁰The cost data we present are for single-family homes; however, our survey found that the per-unit cost to evaluate for lead was similar for single-family and multifamily homes. Roughly 50 percent of voucher families with young children lived in single-family homes as of year-end 2019. See app. III for additional detail on voucher units by housing type. In addition, we do not include cost estimates for conducting lead hazard screens because the number of survey respondents reporting this method was too small to be statistically reliable.

Evaluation method price range

Combination Lead Inspection and Risk Assessment Price for Single Family Homes \$500 or less -1,000

Note: The survey response categories for the lower bounds of the cost ranges were \$50 or less for selective dust wipe sampling, \$300 or less for lead paint inspections, \$400 or less for risk assessments, and \$500 or less for combination evaluations.

A number of factors can affect the cost of lead evaluations. The most common factors affecting lead evaluation costs are driving distance to property, type of housing (such as single-family or multifamily homes), number of rooms in the property, and number of surfaces to be evaluated, according to estimates based on at least two-thirds of the lead professionals we surveyed.³¹ Among these factors, number of rooms and number of surfaces were the top two factors that survey respondents said contributed to costs to a major extent.³² In addition, according to survey respondents, other factors that can contribute to differences in costs include number of common areas (such as hallways) in multifamily buildings, fees to rent equipment, and whether the client is a repeat customer.

Estimated Initial Costs to Change to Stricter Evaluation Methods Would Vary Based on Evaluation Method Used and Units Included

Estimated costs for initial evaluations associated with changing to stricter lead evaluation methods for the voucher program could be sizeable and would vary depending on the evaluation method selected and units included. The estimates would also vary depending on whether the change were applied to the much smaller number of pre-1978 voucher units occupied by young children (roughly 171,000 housing units) or to all pre-1978 voucher units (roughly 1.1 million housing units).³³ We

³¹The 95 percent confidence intervals for the estimated percentages of lead professionals who responded that these factors affected cost are (70, 84) for driving distance, (69, 83) for type of housing, (68, 82) for number of rooms, and (64, 79) for number of surfaces.

³²The 95 percent confidence intervals for the estimates are (34, 52) and (42, 61), respectively.

³³We calculated the estimated cost for initial evaluations for applying the following four evaluation methods in the voucher program: selective dust wipe sampling, lead inspections, risk assessments, and combination evaluations. We were not able to estimate the total cost for lead hazard screens because we did not receive sufficient survey responses to allow us to calculate an estimate for that method.

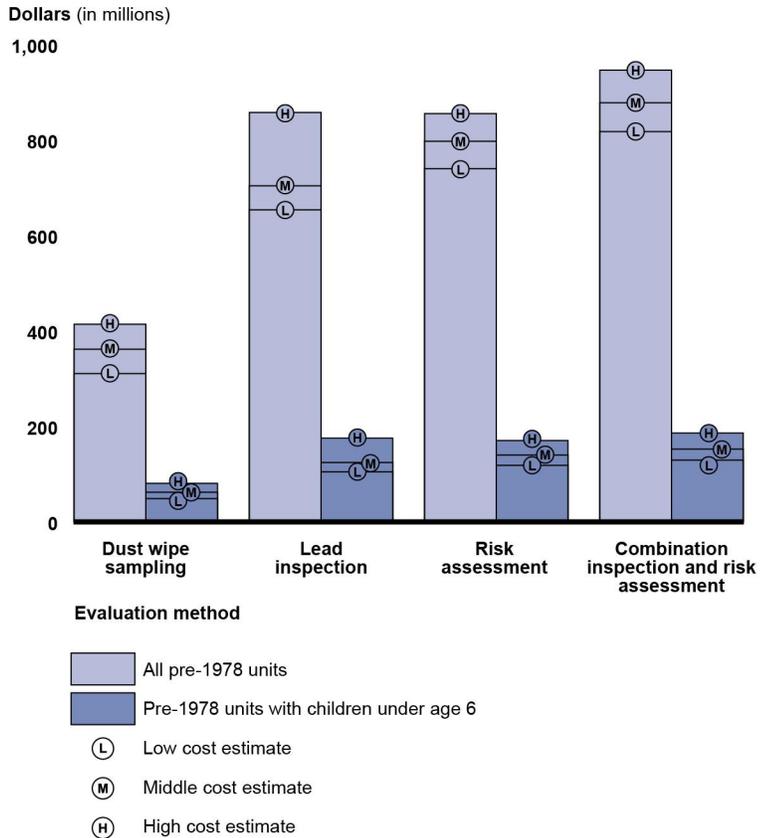
calculated low, middle, and high estimated costs for each of the four evaluation methods using the distribution of per-unit lead evaluation cost ranges based on our survey of lead professionals.³⁴

We found the middle estimated costs for adopting the stricter evaluation methods for pre-1978 voucher units with young children would likely range from about \$60 million for selective dust wipe sampling to \$150 million for combination evaluations (see fig. 11).³⁵ By comparison, if the change were applied to all pre-1978 units, the middle estimated costs would likely range from about \$360 million for dust wipe sampling to \$880 million for combination evaluations.

³⁴To calculate the estimated costs for initial evaluations, we also used our analysis of year-end 2019 HUD data on the total number and type (single-family or multifamily) of pre-1978 voucher units and those occupied by families with young children. Further, we used weighted responses from our survey of lead professionals for the per-unit single-family and multifamily lead evaluation cost ranges to derive the estimated total costs for initial evaluations. The estimates we calculated have sampling error no greater than plus or minus 14 percentage points at the 95 percent level of confidence associated with them. For additional detail about our cost calculations, see app. I.

³⁵Additionally, for our middle and high estimated costs, we varied the number of pre-1978 voucher units occupied by families with young children by an additional 10 percent and 25 percent, respectively, because the voucher program is sensitive to various factors such as voucher holder mobility. As previously discussed, the number of pre-1978 voucher units occupied by families with young children was about 171,000 as of year-end 2019. If this number were to increase by 25 percent, the high estimated total costs for initial evaluations would range from about \$80 million to \$186 million. We made these adjustments because over time, the number of pre-1978 voucher units needed to accommodate the number of voucher families with young children would likely exceed the 2019 number of voucher families with young children, given that voucher families can move residences and may move into units new to the voucher program.

Figure 11: Estimated Costs for Initial Lead Evaluations for Housing Choice Voucher Program, by Evaluation Method



Source: GAO analysis of Department of Housing and Urban Development data and GAO survey of lead professionals. | GAO-21-325

Data table for Figure 11: Estimated Costs for Initial Lead Evaluations for Housing Choice Voucher Program, by Evaluation Method

	Low		Middle		High	
	All pre-1978 units	Pre-1978 units with children under age 6	All pre-1978 units	Pre-1978 units with children under age 6	All pre-1978 units	Pre-1978 units with children under age 6
*Dust wipe sampling	\$310,534,413	\$48,436,775	\$361,628,921	\$62,047,076	\$413,769,725	\$80,674,114
Lead paint inspection	\$653,581,583	\$104,592,294	\$706,186,258	\$124,075,791	\$857,438,385	\$175,371,153
Risk assessment	\$739,972,669	\$118,378,195	\$797,250,321	\$139,949,617	\$855,395,203	\$170,259,524
Combo	\$817,679,366	\$129,144,102	\$877,884,408	\$152,171,978	\$946,258,078	\$185,760,750

Note: We used the distribution of per-unit lead evaluation cost ranges based on our survey of lead professionals, and calculated low, middle, and high estimated costs for initial evaluations. We also

analyzed Housing Choice Voucher program data as of year-end 2019 from the Department of Housing and Urban Development. We used weighted responses from our survey of lead professionals to derive the estimated total costs for initial evaluations. The estimates shown in this figure have sampling error no greater than plus or minus 14 percentage points at the 95 percent level of confidence associated with them.

While these estimated costs for initial evaluations represent less than 5 percent of the approximately \$26 billion appropriated in fiscal year 2021 for tenant-based rental assistance, they represent a potentially much higher portion of the budget dedicated to PHAs' administrative and other expenses for the voucher program.³⁶ For example, depending on the evaluation method used and units included, the estimated costs range from 3 percent to 41 percent of the voucher program's administrative and other expenses budget allocated to PHAs in fiscal year 2021 (\$2.2 billion).³⁷

If HUD were to cover the costs of lead evaluations or share the costs with landlords, HUD staff told us they would likely need to request additional funding from Congress or reallocate existing resources. HUD staff added that HUD would prefer PHAs to coordinate the lead evaluations if stricter evaluation methods were adopted. If the evaluation method were changed, the lead evaluation cost may be an eligible expense under PHAs' administrative and other expenses budget. Later in this report, we discuss how PHAs may be affected by the availability of lead professionals if the evaluation method were to change. If landlords were to cover the costs of the lead evaluations, it would impact their rental profits because of the increased expense and may discourage them from remaining in the voucher program.³⁸

³⁶As previously discussed, HUD requires PHAs to conduct visual assessments as part of the routine physical inspections of voucher units. According to HUD, it is the same administrative expenses budget that also covers the costs of physical inspections in voucher units, including visual assessments for pre-1978 voucher units. HUD does not break out the cost of visual assessments from the cost of the physical inspections of voucher units.

³⁷Specifically, the middle estimated cost would range from about 3 to 7 percent for adopting the stricter evaluation methods for pre-1978 voucher units with young children and from about 17 to 41 percent for all pre-1978 voucher units.

³⁸According to a HUD-funded study, financial reasons are the most important factor affecting landlord participation in the voucher program, with profit motivations being cited as a key determining factor. See 2M Research, *Landlord Participation Study: Multidisciplinary Research Team*, a report prepared for the Department of Housing and Urban Development's Office of Policy Development and Research (Washington, D.C.: Oct. 17, 2018).

Total Costs Would Also Depend on the Mobility of Voucher Households and the Frequency of Any Additional Lead Evaluations

In addition to the cost of initial evaluations, adopting the stricter lead evaluation methods could generate additional costs related to lead evaluations needed when a household changes residence or becomes eligible for the voucher program, and for periodic evaluations of units for households that remain in place.

Voucher household mobility. Voucher household mobility would create costs in addition to the initial evaluation requirement. As previously noted, voucher holders can move at the end of their lease, and a new lead evaluation is required anytime a household with young children moves into a voucher unit. Our analysis of the Census Bureau's American Housing Survey data suggested that voucher families with young children were more likely to have recently moved than those without young children.³⁹ Specifically, an estimated 51 percent of voucher families with young children in 2019 had recently moved.⁴⁰ By comparison, about 33 percent of voucher families with older children only and about 24 percent of those without children moved during that period.⁴¹ Furthermore, low-income families may become qualified for the voucher program, and prior to moving into a voucher housing unit, the unit would need a lead evaluation.

Frequency of additional lead evaluations. The cost of lead evaluations could reoccur over time if lead evaluations were needed periodically. Depending on circumstances, lead evaluations could occur on a one-time basis or could be conducted periodically to help ensure housing units continue to remain lead-safe. For instance, lead evaluations could occur on a one-time basis if the evaluation were to determine the unit was free of lead paint, or if the lead remediation performed after an evaluation were to permanently remove all lead paint in the unit (e.g., abatement by

³⁹We analyzed data from the 2017 and 2019 versions of the Census Bureau's American Housing Survey.

⁴⁰The 90 percent confidence interval for this estimate is (44, 59).

⁴¹The 90 percent confidence intervals for these estimates are (28, 39) and (21, 26), respectively.

removal of all lead paint).⁴² In contrast, lead evaluations could be conducted periodically if the evaluation found lead paint hazards in the unit and the remediation did not permanently remove the lead paint hazards (e.g., interim controls). For example, representatives from localities that already require lead evaluations stricter than visual assessments told us the localities require periodic evaluations of the housing units every 3 to 5 years (as discussed later in this report). If lead evaluations were conducted periodically, the frequency of the periodic evaluations would affect any recurring evaluation costs.

States Vary in Availability of Lead Professionals, and Some PHAs May Need More Implementation Time

Some States Have More Lead Professionals Than Others Relative to Older Voucher Units

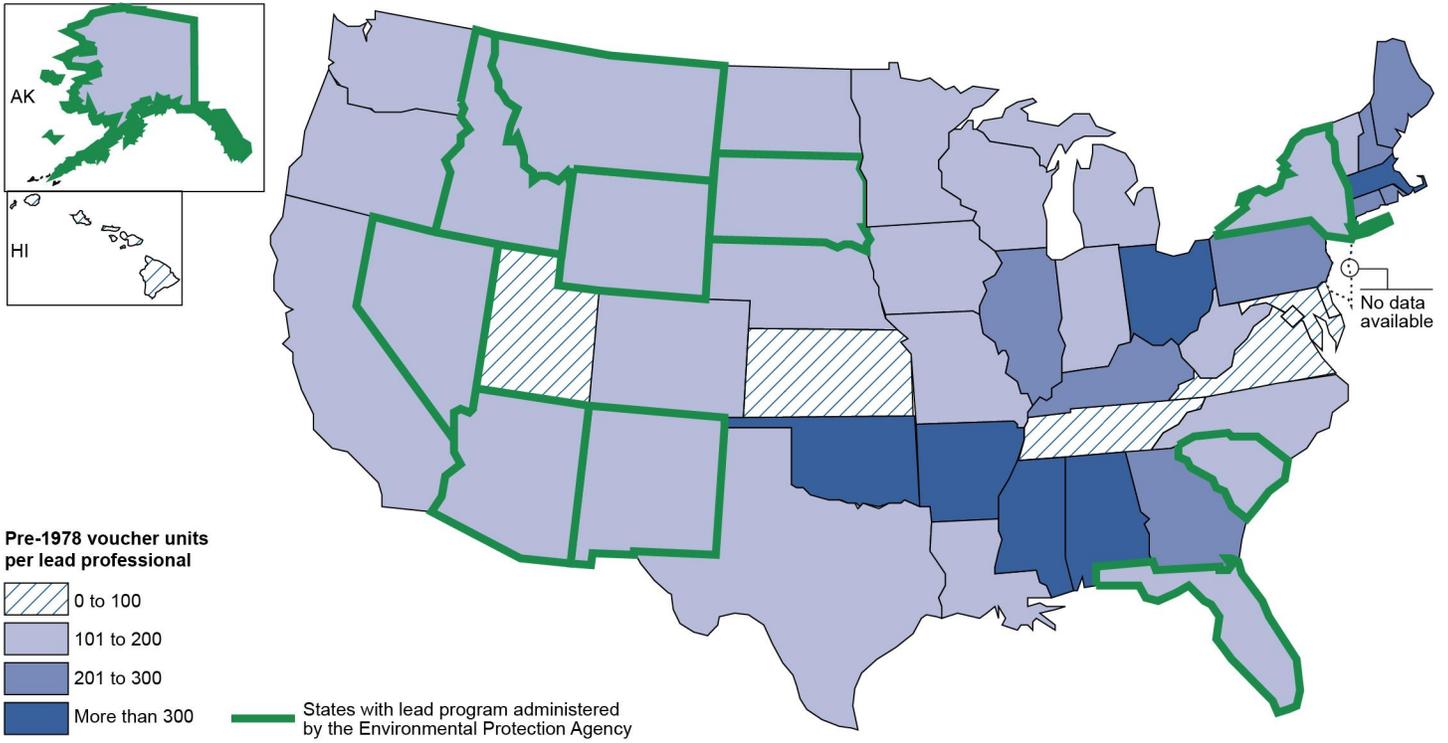
Based on our analysis of EPA and state data, we estimated that there were nearly 6,000 lead professionals in the United States in 2020.⁴³ Additionally, we found that certain states have a greater number of lead professionals to perform lead evaluations for the state's pre-1978 voucher units (see fig. 12).⁴⁴ For example, Connecticut had roughly 27,000 pre-1978 voucher units and about 120 lead professionals—a ratio of about 220 voucher units per lead professional. This ratio decreased to about 30 voucher units per lead professional if only voucher units occupied by families with young children were included.

⁴²At present, if the abatement includes an encapsulation or enclosure, subsequent periodic evaluations are not required if visual assessments or other observations do not find any failures of encapsulations or enclosures. See 24 C.F.R. § 35.1355.

⁴³The lead professionals in this analysis include those who are available for public hire and conduct lead evaluations in residential housing. We analyzed data for 11 states for which EPA administers the lead paint programs and data provided by 38 other states and Washington, D.C., which manage their own lead paint programs. New Jersey did not provide data for lead professionals. The 11 EPA-administered states are Alaska, Arizona, Florida, Idaho, Montana, Nevada, New Mexico, New York, South Carolina, South Dakota, and Wyoming, as previously noted. See app. I for additional information on our analysis.

⁴⁴See app. IV for additional information for each state.

Figure 12: Estimated Number of Pre-1978 Housing Choice Voucher Units Per Lead Professional, by State



Source: GAO analyses of Housing and Urban Development, Environmental Protection Agency, and state data. | GAO-21-325

Data table for Figure 12: Estimated Number of Pre-1978 Housing Choice Voucher Units Per Lead Professional, by State

State	Ratio of pre-1978 voucher units to lead professionals	Label for Map Colors
New Jersey	No data available	No data available
Massachusetts	740	More than 300
Arkansas	611	More than 300
Oklahoma	576	More than 301
Alabama	464	More than 300
Mississippi	370	More than 300
Ohio	355	More than 300
Kentucky	271	201-300
Georgia	266	201-300
New Hampshire	245	201-300
Maine	232	201-300
Rhode Island	224	201-300
Connecticut	221	201-300

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State	Ratio of pre-1978 voucher units to lead professionals	Label for Map Colors
Illinois	207	201-300
Pennsylvania	201	201-300
California	200	101-200
Tennessee	172	101-200
Wisconsin	170	101-200
North Carolina	167	101-200
Oregon	164	101-200
West Virginia	163	101-200
Michigan	159	101-200
Nebraska	149	101-200
Texas	141	101-200
North Dakota	136	101-200
Louisiana	131	101-200
Vermont	117	101-200
Iowa	116	101-200
Minnesota	116	101-200
Missouri	115	101-200
Indiana	114	101-200
Washington	112	101-200
Colorado	101	101-200
Virginia	93	1-100
Kansas	91	1-100
Delaware	83	1-100
Maryland	83	1-100
Utah	46	1-100
Washington, D. C.	44	1-100
Hawaii	32	1-100
All 11 EPA States Combined	176	101-200

Note: We analyzed data from the Department of Housing and Urban Development on voucher units built before 1978, as of year-end 2019. We also analyzed data on lead professionals (lead inspectors and risk assessors) from the Environmental Protection Agency (EPA) and states in 2020. EPA regulations permit a lead professional who is certified in one of the 11 EPA-administered states to also work in any of the other 10 states. We calculated an aggregate ratio for all 11 EPA-administered states. Specifically, we divided the total number of pre-1978 voucher units in these 11 states by the total number of lead professionals in these 11 states. Additionally, New Jersey did not provide data for lead professionals; hence, we were not able to calculate a ratio for the state.

However, a number of states had much higher ratios. For example, Massachusetts had approximately 50,000 pre-1978 voucher units and fewer than 70 lead professionals, a ratio of 740 voucher units per lead

professional. The ratio decreased to about 90 voucher units per lead professional if only voucher units occupied by families with young children were included.

Further, some states also have more professionals who can conduct evaluations in different states or are certified to conduct different types of lead evaluations. Overall, we estimated that the nearly 6,000 lead professionals held over 6,500 EPA or state certifications in 2020, with some holding certifications in multiple states or multiple types of certifications.⁴⁵ For example, a number of lead professionals held certifications to work in Maryland, Virginia, and Washington, D.C. Representatives from EPA and two lead professional industry associations told us that some professionals can choose to become certified in multiple states for business reasons. In areas of the country where some professionals are certified in multiple states, there may be more lead professionals to meet an increased demand for additional lead evaluations than other areas.

In addition, we found that certain states have more professionals with risk assessor certifications relative to their number of pre-1978 voucher units. Of the estimated 6,500 certifications, risk assessor certifications accounted for about 77 percent, while lead inspector certifications accounted for about 23 percent. Lead professionals who have risk assessor certifications can conduct multiple types of evaluations, but professionals with a lead inspector certification are limited to performing lead inspections only (see fig. 13). Several states, such as Texas and Michigan, each had 200 or fewer pre-1978 voucher units per professional with a risk assessor certification, compared to other states, such as Massachusetts and Ohio, which had more than 300 pre-1978 voucher units per professional. As a result, lead professionals in some states may have relatively more voucher units to evaluate than in other states if the risk assessment or the combination evaluation method were adopted.

⁴⁵EPA regulations permit a lead professional who is certified in one of the 11 EPA-administered states to also work in any of the other 10 states. See 40 C.F.R. §§ 745.220(b), 745.226. The EPA accreditation and certification regulations apply only in those states or Indian Country that do not have an authorized state or tribal program.

Figure 13: Professionals Involved in Lead Evaluations

	Professionals involved (certified by Environmental Protection Agency or states):	
	Risk assessor	Lead inspector
Dust wipe sampling 		
Lead paint inspection 		or 
Risk assessment 		
Combination of lead paint inspection and risk assessment 		

Source: GAO analysis of Department of Housing and Urban Development guidelines. | GAO-21-325

Data table for Figure 13: Professionals Involved in Lead Evaluations

- Dust wipe sampling: Risk Assessor
- Lead paint inspection: Risk Assessor or Lead inspector
- Risk assessment: Risk Assessor
- Combination of lead paint inspection and risk assessment: Risk Assessor

No Indication of a National Shortage of Lead Professionals, but Some PHAs May Need More Time for Implementation

Available information does not suggest a national shortage of lead professionals. We estimated that the wait times for lead evaluation services were 1 week or less for the vast majority of lead professionals

(84 percent), based on the analysis of our survey data.⁴⁶ We also estimated that for nearly 60 percent of lead professionals, the demand for lead evaluations stayed about the same in 2019 compared to prior years, based on our survey analysis.⁴⁷ Similarly, representatives of EPA and two industry associations told us they saw no indication of a national shortage of lead professionals. EPA staff said the number of lead professionals in the 11 EPA-administered states remained relatively stable from 2014 to 2020. Representatives of two lead industry associations also noted that more people would likely obtain lead certifications if the industry anticipated an increase in demand, as has historically been the case.⁴⁸

Data on the availability of lead professionals are important because part of the costs of a change to stricter lead evaluation methods might relate to whether the increased demand for lead evaluations would affect the price of those services. An increase in demand could lead to a shortage of lead professionals, which in turn could lead to an increase in the price of lead evaluations, at least in the short term. If this were to occur, the total cost of initial evaluations could rise.

There may be certain areas of the country where an increase in the demand for lead evaluations might be more likely to strain the availability of lead professionals. In these localities, prices of lead evaluations might be more likely to increase. However, such a price increase would be less likely if the number of additional evaluations needed were small compared to the existing volume of evaluations. For example, a price increase would be less likely if the new evaluation methods were applied

⁴⁶The 95 percent confidence interval for this estimate is (78, 89). We defined wait times as the time between a client scheduling an appointment for a lead evaluation and the lead professional conducting the service.

⁴⁷The 95 percent confidence interval for this estimate is (52, 67). Additionally, we estimated that about 27 percent of lead professionals experienced an increase while the remaining 14 percent experienced a decrease in the overall demand for the services they provide, with 95 percent confidence intervals of (20, 34) and (8, 20), respectively.

⁴⁸For example, representatives from the Environmental Information Association stated that the number of lead professionals in general increased when EPA issued new regulations in 2008 related to lead paint activities. Similarly, representatives from the Lead and Environmental Hazard Association mentioned that more people became lead professionals in California in recent years because they anticipated increased demand for lead evaluations as the result of a legal settlement between lead paint manufacturers and cities. In 2019, the nation's largest suppliers of lead paint agreed to pay California cities \$305 million to settle a lawsuit. See Joint Motion for Judgment of Dismissal with Prejudice, App. A, *California v. Conagra, et al.*, No. 1-00-cv-788657 (Cal. Super. Ct. July 17, 2019).

solely to pre-1978 units with young children (about 171,000) rather than to all pre-1978 voucher units (about 1.1 million) because the additional demand increase would be more modest. If prices were to increase as a result of the evaluation change, even if temporarily, the higher costs of evaluations would apply not only for lead evaluations performed for voucher housing units, but also for evaluations for other property owners. Any price increase that does occur would likely be temporary as additional people would likely obtain lead certifications in response to the rise in demand, as previously discussed.

While there is no indication of a national shortage of professionals in the lead industry, PHAs located where there are high numbers of pre-1978 voucher units and low numbers of lead professionals may face implementation challenges or need additional time if required to implement a stricter evaluation method.⁴⁹ Further, PHAs with larger concentrations of pre-1940 units occupied by young children may face greater implementation challenges because a large proportion of voucher units would require the stricter lead evaluation. More specifically, voucher holders living in housing constructed before 1940 may warrant prioritization for lead evaluations if stricter evaluation methods were adopted, as their units may pose a greater health risk to young children.

A representative from a lead professional industry association noted that PHAs in states with more than 300 pre-1978 voucher units per lead professional would likely need at least 2 to 4 years to complete the initial lead evaluations if stricter lead evaluation methods were adopted. However, representatives from another lead professional industry association told us that the industry could either absorb the increased demand for services or that more environmental professionals would obtain lead certifications.⁵⁰ These representatives noted the training and certification requirements to become a lead professional can be completed in days, not years, in most states.

Additionally, according to HUD staff, PHAs in rural or less-populated areas may face bigger challenges implementing a stricter lead evaluation method because fewer lead professionals may be available in these

⁴⁹HUD staff noted that PHAs may eventually get their staff trained and certified to become lead professionals to conduct the lead evaluations, but initially, PHAs would need to rely on existing lead professionals.

⁵⁰Environmental professionals could include professionals who address issues such as asbestos and mold.

areas. HUD staff further noted that because voucher units may need both an initial lead evaluation and a physical inspection prior to tenant move-in, this could contribute to delays for tenants moving into the voucher housing units. Such delays could be more pronounced for some PHAs.

Furthermore, certain PHAs may take longer to implement a change if the new evaluation method requires more time to perform. We estimated that at least 83 percent of the lead professionals generally can perform a risk assessment or a lead inspection in half a business day or less (ranging from less than 1 hour to 4 hours), while the combination evaluation method takes longer (ranging from less than 2 hours to 5 hours), according to our survey of lead professionals.⁵¹ Therefore, if the evaluation method were to change to the combination method, it would likely take PHAs longer to implement the change compared with other methods. In particular, PHAs in areas with fewer lead professionals with risk assessment certifications may need additional time for lead professionals to obtain the additional certifications for performing the combination evaluations.

Selected Cities Offer Observations from Their Implementation of a Stricter Lead Evaluation Method

Representatives of PHAs and local advocacy organizations in five cities provided observations that could help retain landlords in the voucher program, as well as helping them better understand and comply with a stricter lead evaluation method if it were applied.⁵² HUD staff noted that some actions taken by these five localities could require statutory or regulatory changes were they to be applied to the voucher program. However, the localities' experience in moving to a stricter evaluation

⁵¹These data are for single-family homes, but our survey estimated that time frames for conducting the different types of lead evaluations are similar for single-family and multifamily homes. The 95 percent confidence intervals for the estimated percentages of lead professionals that responded less than 1 to 4 hours and less than 2 to 5 hours are (74, 94) for a risk assessment, (82, 94) for a lead inspection, and (70, 92) for a combination evaluation in a single-family home.

⁵²We interviewed PHAs and local advocacy organizations in Detroit, Newark, Philadelphia, Rochester, and Washington, D.C. The advocacy organizations are Lakeshore Legal Aid in Detroit, Advocates for Children of New Jersey in Newark, Community Legal Services in Philadelphia, Coalition to Prevent Lead Poisoning in Rochester, and Children's Law Center in Washington, D.C.

method could offer insights into potential options for implementation. Their observations relate to the practices described below.

Educate landlords. Advocacy organizations and PHAs in the five cities stated that education and outreach could help clarify any new lead evaluation requirements and encourage landlords to continue to rent to voucher holders. For example, representatives from advocacy organizations in Detroit and Rochester told us that their organizations and the city governments held meetings with landlords to inform them about the lead evaluation requirements. Additionally, representatives from four PHAs said they held education events for landlords to help them understand the voucher program requirements, including those related to lead paint. Representatives from these four PHAs added that they provided landlords with periodic newsletters and other documents that explained lead paint and related requirements.

Require periodic evaluations less frequently. Because paint can deteriorate over time, evaluations may need to be conducted on a periodic basis to help ensure the housing units continue to be lead-safe. Less frequent periodic evaluations may be easier for landlords to comply with, according to representatives from Detroit and Philadelphia. For instance, landlords in Detroit are required to evaluate their rental units again after the initial inspection every 1 to 5 years, depending on the lead hazard control method used. However, representatives from Detroit told us that the periodic evaluations are generally done every 3 years because it would not be practical for landlords to arrange the logistics of a periodic evaluation on an annual basis. Similarly, a representative from a Philadelphia advocacy organization noted that Philadelphia requires landlords to perform periodic evaluations every 4 years. According to the representative, the locality originally proposed that periodic evaluations be conducted every 3 years, but the original proposal was met with resistance from landlords.

As previously noted, HUD currently requires visual assessments for deteriorated paint to identify potential lead paint hazards prior to move-in and every year thereafter in pre-1978 voucher units occupied by families with one or more young children. According to HUD staff, because paint can deteriorate over time, increasing the time between periodic evaluations would increase the risk of lead paint hazards, and thus, increase health risk to young children.

Implement change in phases based on risk. Implementing any new lead evaluation method in phases could target the areas with the greatest

need and help landlords and the industry adapt to any new requirement and the increased demand for lead evaluations. For example, the cities of Rochester, Detroit, and Philadelphia implemented the change to a stricter lead evaluation method using a phased approach based on risk, according to representatives of advocacy organizations in each of these three cities. Specifically, the representatives told us that these cities implemented the stricter method in geographic areas with the highest percentage of children with elevated blood lead levels.

A phased approach helps implement the change in the highest-risk areas first while not overwhelming landlords or the lead professional industry with an influx of new evaluations all at once. Additionally, implementing the change through a phased approach allows time for landlord education. Furthermore, PHAs and landlords may need some time to identify the appropriate lead professionals and coordinate with tenants to carry out the new lead evaluation requirement. For example, as we previously discussed, PHAs and landlords in some states may need additional time to identify the lead professionals with the appropriate certifications, depending on the evaluation method selected.

Agency Comments

We provided a draft of this report to HUD and EPA for review and comment. In their comments, reproduced in appendixes V and VI, HUD did not raise any concerns with the findings in the report, and EPA agreed with the findings. Both agencies also provided technical comments, which we incorporated as appropriate.

We are sending copies of this report to the appropriate congressional committees, the Secretary of the Department of Housing and Urban Development, the Administrator of the Environmental Protection Agency, and other interested parties. In addition, the report is available at no charge on the GAO website at <https://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-8678 or PendletonJ@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report are listed in appendix VII.

Letter

A handwritten signature in black ink that reads "John H. Pendleton". The signature is written in a cursive style with a long horizontal flourish extending to the right.

John H. Pendleton
Director, Financial Markets and Community Investment

Appendix I: Objectives, Scope, and Methodology

This report identifies considerations for policymakers related to changing to stricter lead evaluation methods for the Department of Housing and Urban Development's (HUD) Housing Choice Voucher program (which we refer to as the voucher program). Specifically, the report (1) identifies the number and characteristics of voucher units built before 1978 and their occupants, (2) examines estimated costs for lead evaluations and factors that could affect these costs, (3) examines the availability of lead professionals, and (4) provides observations from selected cities that use lead evaluation methods stricter than visual assessments. This report focuses on HUD's voucher program and not on other HUD rental assistance programs.¹

To address all four objectives, we reviewed HUD's 2012 guidelines for evaluation and control of lead paint hazards in housing and relevant HUD and Environmental Protection Agency (EPA) regulations, such as the Lead Safe Housing Rule.² We also reviewed annual appropriation amounts for fiscal years 2017 through 2021 in annual appropriations acts and HUD's budget documents to provide context on HUD's voucher program and other lead program resources. To gain a better understanding of the lead evaluations used in HUD rental assistance programs and the voucher program, we interviewed HUD staff from the Office of Lead Hazard Control and Healthy Homes (Lead Office), Office of Public and Indian Housing, and Office of Policy Development and Research.

We also interviewed staff from EPA, representatives from two industry associations that represent lead professionals, national organizations that advocate for safe and affordable housing, and one academic expert from Columbia Law School to obtain a better understanding of lead paint evaluation methods and the lead professional industry. The two industry

¹For additional information on lead in HUD's project-based rental assistance program, see GAO, *Lead Paint in Housing: HUD Has Not Identified High-Risk Project-Based Rental Assistance Properties*, [GAO-21-55](#) (Washington, D.C.: Dec. 16, 2020).

²See e.g., Department of Housing and Urban Development, Office of Healthy Homes and Lead Hazard Control, *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* (Washington, D.C.: July 2012); 24 C.F.R. pt. 35; 40 C.F.R. pt. 745.

associations were the Lead and Environmental Hazards Association and the Environmental Information Association. The national organizations were the National Affordable Housing Management Association, the Council of Large Public Housing Authorities, the National Center for Healthy Housing, the National Housing Law Project, and the National Conference of State Legislatures.

Number and Characteristics of Voucher Housing Units

To address the first objective, we analyzed data from HUD's Inventory Management System/PIH Information Center database on housing units occupied by voucher holders as of December 31, 2019 (referred to as HUD voucher data as of year-end 2019 throughout this report). These data were the most recently available at the time of our review. Specifically, for voucher housing units, we analyzed construction year, geographic location, and the date of birth of all children residing in the units.³ We estimated the number of voucher housing units by their construction year, including those built before 1978 and occupied by families with at least one child under the age of 6 (which we refer to as young children). Additionally, for the pre-1978 units occupied by young children, we further estimated the number of units in each state built in three periods: before 1940 (which we refer to as very old housing), 1940–1959, and 1960–1977. For units built in each of the three periods, we calculated their share of the respective state's voucher housing units. We also reviewed data from HUD's most recent American Healthy Homes Survey for estimates of housing units containing lead paint.⁴

To assess the reliability of HUD's voucher data, we performed electronic data testing to identify missing or invalid data, interviewed knowledgeable HUD staff, and corroborated the data with other available sources (such

³For reporting of voucher units by geographic area, we excluded about 5,900 voucher units (less than 2 percent) with young children located in the U.S. territories. See app. II for additional information for each state.

⁴All data were current as of March 2006, the year of survey collection in the most recent publication by HUD's Lead Office. See Department of Housing and Urban Development, Office of Healthy Homes and Lead Hazard Control, *American Healthy Homes Survey: Lead and Arsenic Findings* (April 2011). HUD staff noted that the agency is conducting the *American Health Homes Survey II*, with data collected between May 2018 and May 2019, and final results are forthcoming. HUD staff also noted that the preliminary results on estimates of lead paint trends in housing units were similar to data from the 2011 study. For more information, see HUD's website, https://www.hud.gov/program_offices/healthy_homes/ahhs_ii.

as published HUD reports). We excluded about 309,900 housing units (13 percent) that did not have a voucher-holder tenant as of year-end 2019.

Among the approximately 2.1 million voucher housing units we included in our analyses, about 127,000 voucher units (approximately 6 percent) did not have a valid construction year. To address this data limitation, we classified about 82,300 of these units as having been built before 1978 and 44,600 as having been built after 1977, based on the construction-year pattern of other nearby voucher units in the same geographic area of the corresponding public housing agency (PHA).⁵ However, we were not able to reliably make this determination for about 2,200 units and therefore dropped them from our analysis specific to voucher units by construction year and geographic location. For the 82,300 voucher units that did not have a valid construction year and were assigned to the pre-1978 construction year category, we were not able to determine an exact year of construction. Of the 82,300 voucher units, about 12,900 units were occupied by families with young children. We determined the voucher data were sufficiently reliable for our purposes of estimating the number of voucher housing units built before 1978 and the number occupied by families with young children, as well as characterizing the location of these voucher units.

Lead Professional Survey and Estimated Costs

To address the second objective, we took the following steps:

Survey of lead professionals on lead evaluation costs. We administered a web-based survey to a generalizable sample of 624 lead professionals (lead inspectors and risk assessors) nationwide to obtain information on per-housing-unit costs of four types of lead evaluations and factors that affect cost. The four types of lead evaluations were selective dust wipe sampling, lead inspections, risk assessments, and combination evaluations.⁶ To build our lead professional population frame, we used data from EPA for the 11 states for which the agency administers a lead paint program and from 38 states and the District of

⁵PHAs are state and local agencies that administer HUD's rental assistance programs, including the voucher program.

⁶We included survey questions related to another evaluation method known as lead hazard screens in our survey. However, we did not receive sufficient survey responses related to lead hazard screens to allow us to report on the corresponding cost information.

Columbia that administer their own lead paint programs.⁷ In January 2020, we obtained data on lead professionals from EPA. We obtained the data from the remaining 38 states and the District of Columbia between May and July 2020. Specifically, we requested the following information from state lead program managers for each lead professional in their state: name, type(s) of lead certification(s) held, email address, phone number, physical address, and employer name.

We limited our analysis to lead professionals available for public hire in residential housing. However, EPA and state data did not specify whether the lead professionals were for public hire. As a result, we reviewed the population frame to identify and exclude professionals who might not be available for public hire based on their email addresses or employer names, including those who worked for government agencies such as health departments and schools.⁸ In addition, we excluded 16 risk assessors with physical addresses in U.S. territories or outside of the United States.

To allow us to compare the costs of various types of lead evaluations, we used a stratified sampling method to select a representative sample that included a mix of lead professionals in four strata, based on the lead certifications they held: (1) lead inspector certification, (2) risk assessor certification, (3) both lead inspector and risk assessor certifications, and (4) a single, combined lead inspector and risk assessor certification (used in California, Iowa, and Rhode Island). For lead professionals in our sample who did not have email addresses or phone numbers, we conducted internet searches to find such information, based on the professionals' names or employers. We also confirmed the accuracy of the contact information we found by calling the lead professionals or their employers.

Prior to selecting the stratified random sample, we sorted the lead professionals by address within each stratum and then selected a

⁷EPA administers the lead paint program in 11 states and has delegated program authority to the remaining 39 states and the District of Columbia to administer their own programs. The 11 EPA-administered states are Alaska, Arizona, Florida, Idaho, Montana, Nevada, New Mexico, New York, South Carolina, South Dakota, and Wyoming. Additionally, the New Jersey state lead program did not provide information on the state's certified lead professionals, and the state website included information for only the evaluation firms. However, we were able to include some professionals in that state in our survey sample based on the physical addresses included in their EPA certifications.

⁸For example, we excluded lead professionals whose email addresses included domains such as gov or edu.

systematic random sample. We followed this approach to stratify implicitly by geography. For purposes of our analysis, we treated our sample as a simple random selection within each stratum.

For sampling lead professionals certified in the 11 EPA-administered states, we assigned the state of certification based on their physical address. We did this because EPA data did not specify the state of certification and, under EPA regulations, these professionals can work in all 11 EPA-administered states. Furthermore, because some lead professionals held the same type of certifications in multiple states, we identified these individuals based on their certification types, email addresses, phone numbers, or employers. This helped ensure that, to the extent possible, we did not select a lead professional more than once in our sample.

Using a 95 percent level of confidence, we calculated the sample size so that the margin of error for an attribute measure would be no greater than plus or minus 10 percentage points at the stratum level for each type of lead professional. The initial sample size allocations were adjusted upward on the assumption of a 50 percent response rate. Our original sample size was 710. However, based on email addresses and phone numbers we obtained from our internet searches, we determined that 86 of the 710 professionals in the original sample were in fact not available for public hire. We excluded these 86 professionals from our final sample. Our final sample sizes for each type of lead professional are shown in table 2.

Table 2: Survey Population, Sample Size, and Number of Survey Respondents, by Stratum (Certification Type)

Stratum	Population size	Sample size	Responded to survey
Lead inspector certification	1,680	138	53
Risk assessor certification	3,687	161	72
Both lead inspector and risk assessor certification	451	153	52
Single, combined certification of lead inspector and risk assessor	962	172	67
Total	6,780	624	244

Source: GAO analysis of Environmental Protection Agency and state data. | GAO-21-325

Note: Some lead professionals held certifications in multiple states and were included in the population for each state in which they held a certification.

The survey included questions on the per-unit costs of four types of lead evaluations in residential housing units, the extent to which certain factors contribute to costs, the time required to conduct these evaluations, and the demand for lead evaluation services. To develop our survey instrument, we reviewed HUD's 2012 guidelines for evaluations and control of lead paint hazards in housing and observed two lead evaluations conducted by lead professionals in Oakland, California, and Baltimore, Maryland.⁹ Further, we interviewed representatives from HUD, EPA, and two industry organizations representing lead professionals. To help ensure that our survey questions were relevant and reasonable and that survey respondents could provide reliable and valid responses, we conducted nine pretests of our survey instrument with lead professionals in a variety of states (California, Georgia, Kansas, Michigan, Oregon, and Vermont), and incorporated their feedback. Our survey expert also reviewed the instrument and provided feedback.

We administered our survey over about a 2-month period (from September 14 through November 20, 2020). To encourage participation, we conducted follow-up efforts, including sending multiple email reminders and contacting nonrespondents through phone calls. These reminders allowed us to encourage survey recipients to complete the survey.

We received responses from approximately 39 percent (244) of the sample.¹⁰ We tested for statistical response bias using logistic regression models and available administrative variables, and did not find any statistical response bias. We adjusted the base sampling weights for nonresponse within each stratum.

We analyzed survey results for the lead professionals in aggregate regardless of the types of certifications they held and their state of certification. We examined the ranges of per-unit cost and time associated with conducting various types of lead evaluations, the extent to which certain factors affect cost, and the demand and wait times for conducting lead evaluations.

⁹Department of Housing and Urban Development, Office of Healthy Homes and Lead Hazard Control, *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* (Washington, D.C.: July 2012).

¹⁰This is the unweighted response rate (the number of respondents divided by the number sampled).

Because we followed a probability procedure based on random selections, our sample is only one of a large number of samples that we might have drawn. Because each sample could have provided different estimates, we express our confidence in the precision of our particular sample's results as a 95 percent confidence interval (for example, plus or minus 10 percentage points). This is the interval that would contain the actual population value for 95 percent of the samples we could have drawn. Confidence intervals are provided along with each sample estimate in the report. All survey results presented in the report are generalizable to the respective population of in-scope lead professionals across the United States, except where otherwise noted.

In addition to the reported sampling errors, the practical difficulties of conducting any survey may introduce other types of error, commonly referred to as nonsampling errors. For example, differences in how a particular question is interpreted, the sources of information available to respondents, or the types of people who do not respond can introduce unwanted variability into the survey results. We included steps in both the data collection and data analysis stages to minimize such nonsampling errors.¹¹

Estimates of potential costs of initial lead evaluations. Using the survey data on the per-unit cost of evaluations and HUD's voucher program data as of year-end 2019, we calculated the estimated costs of initial evaluations for four lead evaluation methods: selective dust wipe sampling, lead inspections, risk assessments, and combination evaluations.¹² More specifically, we calculated low, middle, and high estimated costs using the distribution of per-unit lead evaluation cost ranges based on our survey of lead professionals. We calculated the potential costs based on the number and type of voucher units at a specific point in time—year-end 2019.

Because there were uncertainties associated with these estimated costs, we varied the inputs used in the cost calculations and described how

¹¹For example, we worked with lead professionals to develop accurate sample frames, pretested the survey instrument, followed up with nonrespondents to achieve at least a 39 percent response rate, developed logic rules to identify inconsistent responses, analyzed item nonresponses, and adjusted for survey nonresponse.

¹²As previously noted, we did not focus on lead hazard screens in this report. While we asked questions related to lead hazard screens in our survey, we were not able to estimate the total cost for lead hazard screens because we did not receive sufficient survey responses to allow us to calculate an estimate for that method.

these estimates could be sensitive to various factors, in particular voucher holder mobility. More specifically, because the voucher program does not have a fixed housing stock, there is uncertainty associated with the baseline number of voucher units that would need initial lead evaluations. Estimated total costs for initial evaluations would likely be higher than the estimates based on the number of pre-1978 voucher housing units as of year-end 2019 because voucher holders can move, and because new voucher holders may select different units than those selected by voucher holders leaving the program. Each of these situations may trigger the need for an additional initial evaluation. More specifically, for our middle and high estimated costs, we varied the number of pre-1978 voucher units occupied by families with young children by an additional 10 percent and 25 percent, respectively. Finally, we used weighted responses from our survey of lead professionals to derive the estimated total costs for initial evaluations; the estimates we calculated have sampling error associated with them.

To provide context on voucher holder mobility, we analyzed 2017 and 2019 data from the Census Bureau's American Housing Survey.¹³ For example, we analyzed the American Housing Survey data to determine the percentage of voucher families with young children that changed residences between 2017 and 2019. We also examined the share of housing units that were occupied by a voucher household with children in 2019 and were also occupied by a voucher household in 2017.

Availability of Lead Professionals

To address the third objective, using the population frame of certified lead professionals and survey results, we analyzed the data to estimate the number of professionals and certifications they held overall and in each state. Similar to our survey analysis, our analysis of lead professionals included risk assessors and lead inspectors available for public hire in the United States in 2020.¹⁴ Based on lead professionals' survey responses on whether they were available for public hire in residential housing, we

¹³The American Housing Survey is sponsored by HUD and conducted by the Census Bureau. The survey is the most comprehensive national housing survey in the United States.

¹⁴We were not able to estimate the number of lead professionals for the state of New Jersey because the state did not provide information on its individual lead professionals, and the state website included information only for the evaluation firms.

estimated that 91 percent of the lead professionals in the population frame were available for public hire in residential housing units.¹⁵ In addition, we estimated the number of certifications held by these lead professionals. To assess the reliability of the EPA and state data, we conducted electronic data testing to identify missing data, interviewed knowledgeable EPA staff, and spot-checked information by comparing it with other publicly available online sources. We determined the data were sufficiently reliable for the purposes of estimating the number of certified lead professionals and certifications in the United States.

Using our lead professional estimates and HUD's voucher program data as of year-end 2019, we calculated ratios of the number of pre-1978 voucher units in each state in relation to the state's number of lead professionals (see app. IV). Similarly, we calculated ratios for each state's pre-1978 voucher units occupied by families with young children. Because EPA regulations permit a lead professional who is certified in one of the 11 EPA-administered states to also work in any of the other 10 states and EPA's data do not specify a state of certification, we calculated an aggregate ratio for all 11 EPA-administered states combined.¹⁶ Furthermore, we did not include the U.S. territories in our analysis because of the small number of pre-1978 voucher units (9,400 units or about 1 percent of the pre-1978 voucher units in the United States).

Finally, we interviewed representatives from EPA and two industry organizations representing lead professionals to obtain their perspectives on the current capacity of the lead professional industry and how the industry might respond to potential increased demand for lead evaluation services.

Observations from Five Cities

To address the fourth objective, we interviewed representatives of PHAs and advocacy organizations in five cities that already require a lead evaluation method stricter than visual assessments for certain rental

¹⁵The 95 percent confidence interval for this estimate is (86, 95).

¹⁶We did not classify lead professionals certified in the 11 EPA-administered states to a specific state based on their physical addresses. Because some of these professionals' physical addresses were not in one of the EPA-administered states, classifying their state of certification based on their physical address could artificially inflate the number of lead professionals for some non-EPA-administered states, in particular smaller states.

units. The five cities were Detroit, Michigan; Newark, New Jersey; Philadelphia, Pennsylvania; Rochester, New York; and Washington, D.C. We selected these cities to achieve diversity in the lead evaluation methods being used and in geography.¹⁷

In each of the five cities, we spoke to representatives from PHAs with the highest share of voucher units built before 1978 and occupied by families with young children. Specifically, we interviewed representatives from the following PHAs: the Detroit Housing Commission, the Newark Housing Authority, the Philadelphia Housing Authority, the Rochester Housing Authority, and the District of Columbia Housing Authority. Additionally, we selected the advocacy organizations to obtain diversity in geographic area serviced and because their mission or services focused on lead paint or children's health advocacy.¹⁸ Specifically, we interviewed representatives from the following advocacy organizations: Lakeshore Legal Aid in Detroit, Advocates for Children of New Jersey in Newark, Community Legal Services in Philadelphia, Coalition to Prevent Lead Poisoning in Rochester, and Children's Law Center in Washington, D.C. We also spoke with a lead professional and an academic in Detroit, an academic in Rochester, and another academic in Washington, D.C., who were knowledgeable about lead paint evaluations and HUD voucher housing.

We conducted this performance audit from September 2019 to May 2021 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that

¹⁷We selected the five cities based on information about localities that already required an evaluation method stricter than visual assessments in a study conducted by the Columbia Law School Health Justice Advocacy Clinic, and our discussions about such information with representatives from the National Conference of State Legislatures and the National Housing Law Project. See Columbia Law School Health Justice Advocacy Clinic, *Eliminating Lead Poisoning in New York: A National Survey of Strategies to Protect Children* (New York, NY: Columbia Law School, 2019).

¹⁸While we did not interview organizations representing landlords, we reviewed HUD-funded studies examining landlord participation in the voucher program, including practices PHAs identified for encouraging landlord participation. We found these practices to be similar to those identified by PHAs and advocacy organizations we interviewed. For example, see 2M Research, *Landlord Participation Study: Multidisciplinary Research Team*, a report prepared for the Department of Housing and Urban Development's Office of Policy Development and Research (Washington, D.C.: Oct. 17, 2018).

**Appendix I: Objectives, Scope, and
Methodology**

the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Housing Choice Voucher Units by Construction Year and State

Table 3 provides the number and percentage of each state's Housing Choice Voucher units occupied by families with children under the age of 6, by construction year.

Table 3: HUD Housing Choice Voucher Units Occupied by Families with Children under Age 6, by Construction Year and State, as of December 31, 2019

State	Number of units (and percentage of state total) by construction year			
	Before 1940	1940–1959	1960–1977	After 1977
Alabama	193 (3)	1,115 (16)	2,254 (31)	3,608 (50)
Alaska	1 (<1)	19 (3)	183 (29)	433 (68)
Arizona	33 (1)	194 (6)	693 (20)	2,498 (73)
Arkansas	38 (1)	287 (7)	962 (23)	2,815 (69)
California	2,304 (8)	4,704 (15)	8,605 (28)	14,761 (49)
Colorado	181 (4)	465 (11)	1,355 (31)	2,332 (54)
Connecticut	1,286 (34)	754 (20)	930 (25)	819 (22)
Delaware	145 (23)	199 (31)	111 (17)	188 (29)
District of Columbia	30 (22)	45 (33)	20 (15)	40 (30)
Florida	378 (2)	2,448 (15)	4,162 (25)	9,770 (58)
Georgia	220 (2)	1,230 (12)	2,638 (26)	6,073 (60)
Hawaii	64 (3)	190 (10)	733 (37)	973 (50)

**Appendix II: Housing Choice Voucher Units by
Construction Year and State**

State	Number of units (and percentage of state total) by construction year			
	Before 1940	1940–1959	1960–1977	After 1977
Idaho	61 (6)	81 (8)	172 (18)	639 (67)
Illinois	2,930 (21)	2,313 (16)	4,781 (34)	4,185 (29)
Indiana	852 (12)	1,273 (19)	1,779 (26)	2,935 (43)
Iowa	580 (18)	403 (12)	688 (21)	1,593 (49)
Kansas	141 (8)	356 (21)	430 (25)	776 (46)
Kentucky	285 (5)	655 (13)	902 (17)	3,360 (65)
Louisiana	69 (1)	657 (7)	2,157 (24)	6,063 (68)
Maine	207 (21)	212 (21)	174 (17)	405 (41)
Maryland	734 (11)	1,211 (18)	1,665 (25)	3,130 (46)
Massachusetts	1,876 (34)	674 (12)	1,252 (23)	1,699 (31)
Michigan	1,384 (16)	2,937 (33)	2,088 (24)	2,472 (28)
Minnesota	434 (8)	539 (10)	1,324 (25)	2,953 (56)
Mississippi	79 (2)	382 (8)	1,053 (23)	3,148 (68)
Missouri	672 (10)	1,784 (25)	1,762 (25)	2,844 (40)
Montana	69 (10)	80 (11)	151 (21)	406 (58)
Nebraska	312 (13)	359 (15)	513 (22)	1,178 (50)
Nevada	7 (<1)	40 (2)	223 (10)	2,008 (88)
New Hampshire	170 (27)	66 (10)	128 (20)	273 (43)
New Jersey	1,218 (14)	2,077 (23)	1,688 (19)	3,936 (44)

**Appendix II: Housing Choice Voucher Units by
Construction Year and State**

State	Number of units (and percentage of state total) by construction year			
	Before 1940	1940–1959	1960–1977	After 1977
New Mexico	18 (1)	142 (8)	493 (27)	1,187 (65)
New York	7,770 (34)	3,183 (14)	3,970 (17)	7,872 (35)
North Carolina	264 (3)	940 (10)	1,782 (20)	6,037 (67)
North Dakota	30 (3)	73 (7)	225 (21)	732 (69)
Ohio	4,283 (27)	3,477 (22)	4,089 (26)	3,775 (24)
Oklahoma	172 (4)	991 (21)	1,932 (42)	1,517 (33)
Oregon	163 (4)	340 (8)	1,140 (27)	2,627 (62)
Pennsylvania	2,619 (24)	4,909 (46)	1,480 (14)	1,718 (16)
Rhode Island	364 (38)	136 (14)	105 (11)	349 (37)
South Carolina	74 (2)	527 (11)	1,090 (22)	3,169 (65)
South Dakota	70 (7)	124 (13)	155 (16)	637 (65)
Tennessee	252 (3)	853 (11)	1,937 (25)	4,660 (61)
Texas	251 (1)	1,775 (6)	4,974 (17)	22,005 (76)
Utah	45 (3)	104 (7)	304 (19)	1,145 (72)
Vermont	59 (9)	56 (9)	84 (13)	437 (69)
Virginia	346 (5)	897 (13)	1,848 (26)	3,943 (56)
Washington	279 (4)	388 (6)	1,031 (16)	4,771 (74)
West Virginia	217 (9)	482 (19)	418 (17)	1,375 (55)
Wisconsin	682 (19)	625 (18)	832 (24)	1,378 (39)

**Appendix II: Housing Choice Voucher Units by
Construction Year and State**

State	Number of units (and percentage of state total) by construction year			
	Before 1940	1940–1959	1960–1977	After 1977
Wyoming	10 (4)	12 (5)	28 (11)	216 (81)
Total	34,921 (11)	47,783 (15)	73,493 (23)	157,863 (50)

Source: GAO analysis of Department of Housing and Urban Development (HUD) data. | GAO-21-325

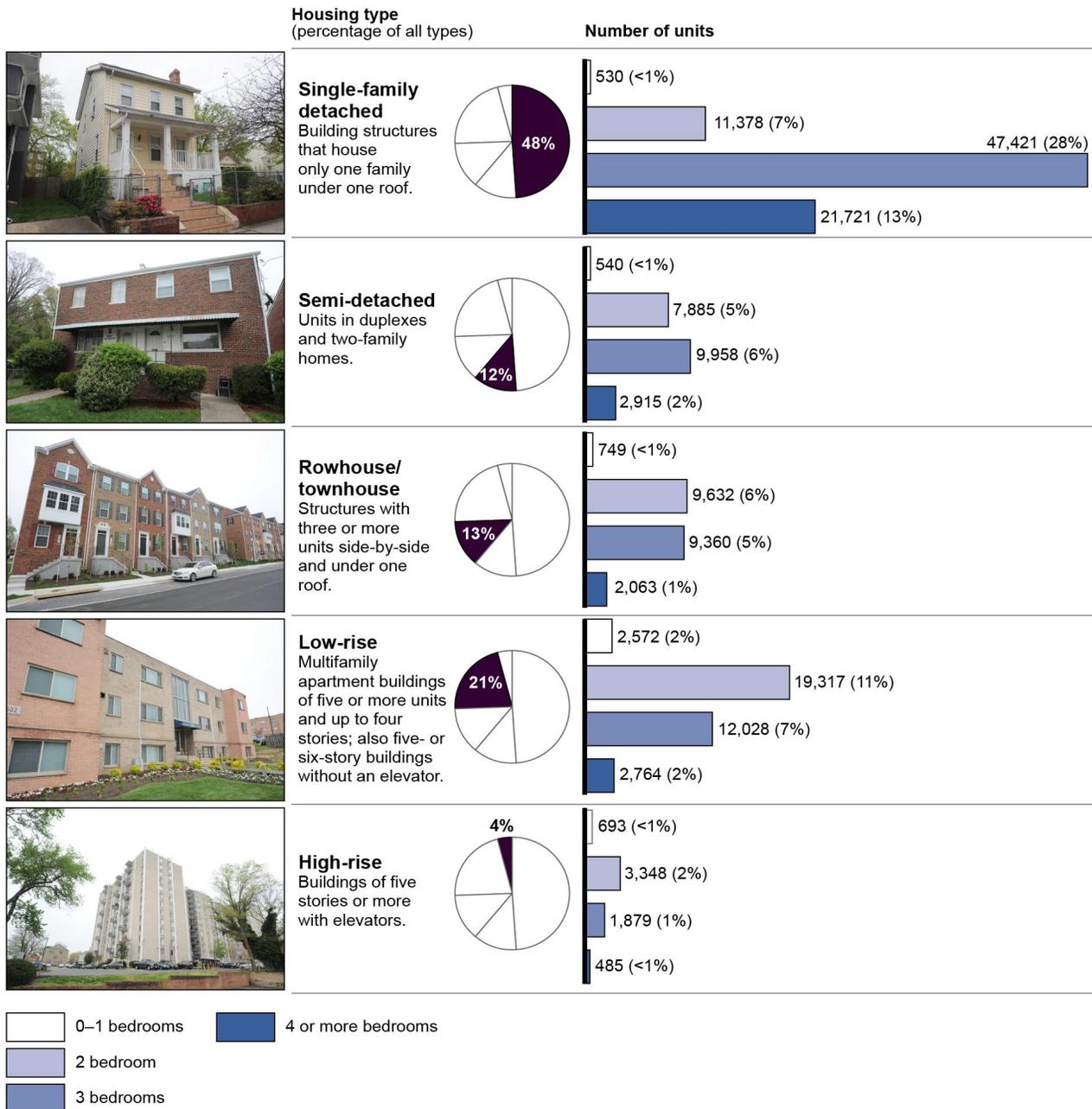
Note: Some percentages do not sum to 100 percent due to rounding. We excluded Housing Choice Voucher units located in the U.S. territories. See app. I for additional information on our analysis.

Appendix III: Housing Choice Voucher Units by Housing Type

Figure 14 describes the number and percentage of Housing Choice Voucher units that were built before 1978 and occupied by families with children under the age of 6, based on housing type.

Appendix III: Housing Choice Voucher Units by Housing Type

Figure 14: Housing Choice Voucher Units Built before 1978 and Occupied by Families with Children under Age 6, by Housing Type, as of December 31, 2019



Sources: GAO analysis of Department of Housing and Urban Development data; GAO (photos). | GAO-21-325

**Appendix III: Housing Choice Voucher Units by
Housing Type**

Data table for Figure 14: Housing Choice Voucher Units Built before 1978 and Occupied by Families with Children under Age 6, by Housing Type, as of December 31, 2019

Structure type	Bedroom category	Flag under 6 adjusted	Bedroom category %	Housing type %
1 SFD	0-1	530	0%	
1 SFD	2	11,378	7%	
1 SFD	3	47,421	28%	
1 SFD	4 or more	21,721	13%	
2 SFD TOTAL		81,050	N/A	48%
2 SFA	0-1	540	0%	
2 SFA	2	7,885	5%	
2 SFA	3	9,958	6%	
2 SFA	4 or more	2,915	2%	
2 SFA TOTAL		21,298	N/A	12%
3 rowhouse/townhouse	0-1	749	0%	
3 rowhouse/townhouse	2	9,632	6%	
3 rowhouse/townhouse	3	9,360	5%	
3 rowhouse/townhouse	4 or more	2,063	1%	
3 rowhouse/townhouse TOTAL		21,804	N/A	13%
4 Low-rise	0-1	2,572	2%	
4 Low-rise	2	19,317	11%	
4 Low-rise	3	12,028	7%	
4 Low-rise	4 or more	2,764	2%	
4 Low-rise TOTAL		36,681	N/A	21%
5 highrise	0-1	693	0%	
5 highrise	2	3,348	2%	
5 highrise	3	1,879	1%	
5 highrise	4 or more	485	0%	
5 highrise TOTAL		6,405	N/A	4%
6 Mfg	0-1	16	0%	
6 Mfg	2	342	0%	
6 Mfg	3	391	0%	
6 Mfg	4 or more	63	0%	
6 Mfg TOTAL		812	N/A	
9 M Oth 0	0	154	N/A	
9 M Oth 0	1	38	N/A	
9 M Oth 0	2	662	N/A	
9 M Oth 0	3	1,082	N/A	

**Appendix III: Housing Choice Voucher Units by
Housing Type**

Structure type	Bedroom category	Flag under 6 adjusted	Bedroom category %	Housing type %
9 M Oth 0	4 or more	639	N/A	
9 M Oth 0	9 missing	4	N/A	
9 M Oth 0 TOTAL		2579	N/A	
		170,631		

Note: We excluded about 3,400 units (2 percent) that were missing structure information or were identified as mobile and manufactured homes or other structure types.

Appendix IV: Number of Pre-1978 Housing Choice Voucher Units and Their Relationship to Lead Professionals

As shown in table 4, states vary in their ratio of the number of Housing Choice Voucher units built before 1978 to lead professionals (lead inspectors and risk assessors).

Table 4: Number of HUD Housing Choice Voucher Units Built before 1978 in Relation to Certified Lead Professionals, by State

State	Number of lead professionals	Number of pre-1978 voucher units	Number of pre-1978 voucher units with children under 6	Number of pre-1978 voucher units per lead professional	Number of pre-1978 voucher units with children under 6 per lead professional
Alabama	31	14,369	3,579	464	115
Alaska ^a	n/a	1,758	205	n/a	n/a
Arizona ^a	n/a	6,502	924	n/a	n/a
Arkansas	10	6,110	1,288	611	129
California	757	151,132	15,808	200	21
Colorado	134	13,557	2,023	101	15
Connecticut	122	26,954	3,782	221	31
Delaware	31	2,567	532	83	17
District of Columbia	141	6,208	706	44	5
Florida ^a	n/a	43,245	7,001	n/a	n/a
Georgia	74	19,686	4,103	266	55
Hawaii	155	5,000	987	32	6
Idaho ^a	n/a	2,212	316	n/a	n/a
Illinois	292	60,387	10,641	207	36
Indiana	168	19,164	4,040	114	24
Iowa	91	10,566	1,932	116	21
Kansas	60	5,487	949	91	16
Kentucky	45	12,182	2,030	271	45
Louisiana	118	15,467	2,922	131	25
Maine	25	5,807	742	232	30
Maryland	307	25,387	3,815	83	12

**Appendix IV: Number of Pre-1978 Housing
Choice Voucher Units and Their Relationship
to Lead Professionals**

State	Number of lead professionals	Number of pre-1978 voucher units	Number of pre-1978 voucher units with children under 6	Number of pre-1978 voucher units per lead professional	Number of pre-1978 voucher units with children under 6 per lead professional
Massachusetts	67	49,570	6,076	740	91
Michigan	210	33,382	6,756	159	32
Minnesota	138	16,060	3,200	116	23
Mississippi	21	7,763	1,516	370	72
Missouri	180	20,753	4,297	115	24
Montana ^a	n/a	2,700	306	n/a	n/a
Nebraska	39	5,819	1,217	149	31
New Hampshire	18	4,403	507	245	28
New Jersey ^b	n/a	40,698	5,282	n/a	n/a
New Mexico ^a	n/a	4,480	654	n/a	n/a
New York ^a	n/a	149,480	17,295	n/a	n/a
Nevada ^a	n/a	2,180	271	n/a	n/a
North Carolina	101	16,914	3,009	167	30
North Dakota	19	2,592	336	136	18
Ohio	181	64,302	12,964	355	72
Oklahoma	25	14,395	3,097	576	124
Oregon	96	15,725	1,656	164	17
Pennsylvania	273	54,787	10,010	201	37
Rhode Island	24	5,385	809	224	34
South Carolina ^a	n/a	8,472	1,697	n/a	n/a
South Dakota ^a	n/a	2,130	359	n/a	n/a
Tennessee	83	14,261	3,050	172	37
Texas	271	38,273	7,128	141	26
Utah	75	3,413	456	46	6
Vermont	17	1,994	267	117	16
Virginia	210	19,500	3,218	93	15
Washington	147	16,432	1,745	112	12
West Virginia	37	6,034	1,151	163	31
Wisconsin	81	13,807	2,358	170	29
Wyoming ^a	n/a	792	51	n/a	n/a

Legend: n/a = not available

Source: GAO analysis of data from Department of Housing and Urban Development (HUD), the Environmental Protection Agency (EPA), and states. | GAO-21-325

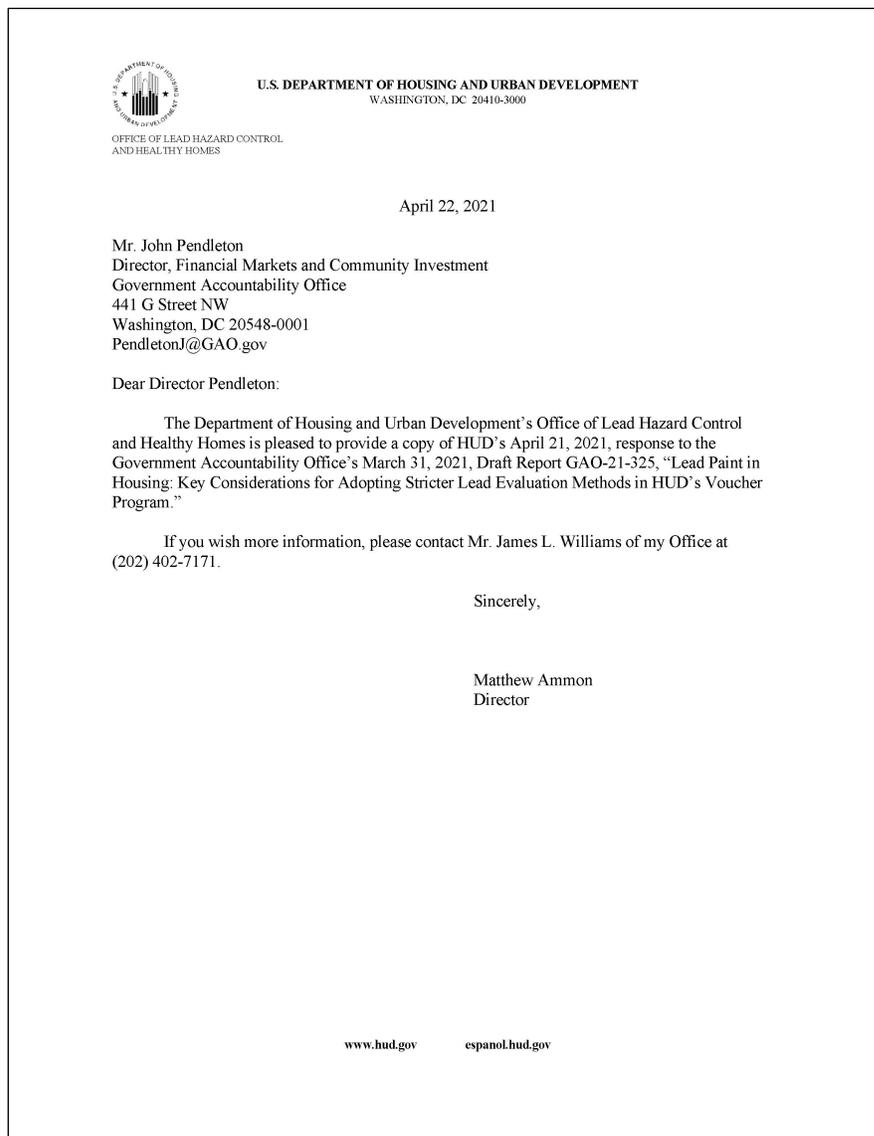
Note: We analyzed HUD's data on voucher units as of year-end 2019 and EPA and state data on lead professionals as of 2020. Because some professionals held lead certifications in more than one state, we included them for each state in which they held lead certification. Overall, we estimated there were nearly 6,000 individual lead professionals nationwide. See app. I for additional information on our analysis.

**Appendix IV: Number of Pre-1978 Housing
Choice Voucher Units and Their Relationship
to Lead Professionals**

^aEPA administers the lead programs in 11 states: Alaska, Arizona, Florida, Idaho, Montana, Nevada, New Mexico, New York, South Carolina, South Dakota, and Wyoming. EPA regulations permit a lead professional (lead inspector or risk assessor) who is certified in one of the 11 EPA-administered states to also work in any of the other 10 states. We estimated about 1,300 lead professionals were certified in these 11 states. The aggregate numbers of pre-1978 voucher units and, within those, units with children under the age of 6 per lead professional for all 11 EPA-administered states combined were 176 and 23, respectively.

^bWe were not able to report on the number of lead professionals certified in New Jersey because the state lead paint program did not provide the data.

Appendix V: Comments from the Department of Housing and Urban Development



Text of Appendix V: Comments from the Department of Housing and Urban Development

April 22, 2021

Mr. John Pendleton

Director, Financial Markets and Community Investment

Government Accountability Office

441 G Street NW

Washington, DC 20548-0001

PendletonJ@GAO.gov

Dear Director Pendleton:

The Department of Housing and Urban Development's Office of Lead Hazard Control and Healthy Homes is pleased to provide a copy of HUD's April 21, 2021, response to the Government Accountability Office's March 31, 2021, Draft Report GAO 21 325, "Lead Paint in Housing: Key Considerations for Adopting Stricter Lead Evaluation Methods in HUD's Voucher Program."

If you wish more information, please contact Mr. James L. Williams of my Office at (202) 402-7171.

Sincerely,

Matthew Ammon

Director

Appendix VI: Comments from the Environmental Protection Agency



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

April 21, 2021

OFFICE OF THE
ADMINISTRATOR

Mr. John H. Pendleton
Director
Financial Markets and Community Investment
U.S Government Accountability Office
Washington, DC 20548

Dear Mr. Pendleton:

Thank you for the opportunity to review and comment on GAO's draft report, "*Lead Paint in Housing: Key Consideration for Adopting Stricter Lead Evaluation Methods in HUD's Voucher Program*" (GAO-21-325). The purpose of this letter is to share EPA's technical comments on your draft report.

Protecting Americans from lead hazards is important work we perform here at the EPA that crosses a number of national program offices we manage. Our Offices of Land and Emergency Management and Children's Health Protection and Chemical Safety and Pollution Prevention, whom you worked with extensively throughout this engagement, have reviewed the draft report. EPA recommends a couple of minor edits for consideration, which are found on page 12 of the attached pdf document.

Although you did not make any recommendations to either HUD or EPA, we agree with your assessment and are truly grateful for the opportunity to partner with you and HUD on this important topic. If GAO has any questions on our comments, please contact Wesley Carpenter, Acting Deputy Chief of Staff, at (202) 564-2019.

Sincerely,

A handwritten signature in black ink, appearing to read "Alison L. Cassidy".

Alison L. Cassidy
Deputy Chief of Staff for Policy

Appendix VI: Comments from the Environmental Protection Agency

Enclosure: Draft GAO Report with EPA Technical Comments

cc:

Susan Perkins, EPA GAO Liaison Team
Jeanne Briskin, Director, Office of Children's Health Protection
Michael Benton, AO Audit Follow Up Coordinator
Janet Weiner, OCSPP Audit Follow Up Coordinator
Keisha Thornton, OLEM Audit Follow Up Coordinator
Kristin Knapp, OCIR Representative

Text of Appendix VI: Comments from the Environmental Protection Agency

April 21, 2021

Mr. John H. Pendleton Director

Financial Markets and Community Investment

U.S Government Accountability Office Washington, DC 20548

Dear Mr. Pendleton:

Thank you for the opportunity to review and comment on GAO's draft report, "Lead Paint in Housing: Key Consideration/ or Adopting Stricter lead Evaluation Methods in HUD 's Voucher Program" (GAO-21-325). The purpose of this letter is to share EPA's technical comments on your draft report.

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Sincerely,

Alison L. Cassa

Deputy Chief of Staff for Policy

Appendix VII: GAO Contact and Staff Acknowledgments

GAO Contact

John H. Pendleton, 202-512-8678 or PendletonJ@gao.gov

Staff Acknowledgments

In addition to the contact named above, Beth Faraguna (Assistant Director), Anna Chung (Analyst in Charge), Hiwotte Amare, Carl Barden, Steve Brown, William R. Chatlos, Dahlia Darwiche, Taylor Gauthier, Joshua Lanier, Marc Molino, Jennifer Schwartz, Tyler Spunaugle, Nina Thomas-Diggs, and Elizabeth Wood made key contributions to this report.

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